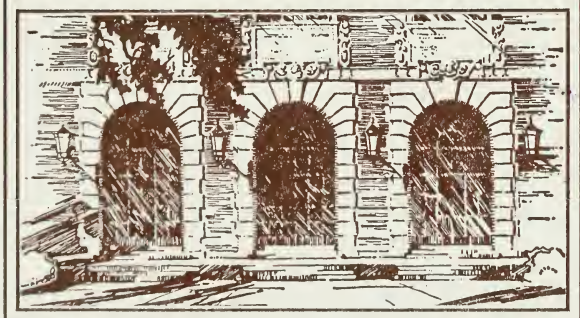


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Flight and Preflight Curricula



UNIVERSITY OF ILLINOIS INSTITUTE OF AVIATION URBANA

AERONAUTICS BULLETIN NO.

21

UNIVERSITY OF ILLINOIS INSTITUTE OF AVIATION

Leslie A. Bryan, Ph.D., LL.B., Director

Gertrude A. Becker, Editor

UNIVERSITY OF ILLINOIS BULLETIN

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Flight and Preflight Curricula

By

LESLIE A. BRYAN

*Director, Institute of Aviation
University of Illinois*

Foreword

The University of Illinois has actively been interested in aviation for a period of time dating at least from World War I. During World War II that interest increased and in 1945 culminated in the establishment of the Institute of Aviation. Among its various activities, the Institute conducts aeronautical research and flight and subprofessional technical training for students of the University.

The Link Foundation, recognizing the pioneering experience of the Institute of Aviation, provided a grant to the University of Illinois Foundation for use by the Institute in preparing and publishing information about its program, believing that the compilation of this information would be valuable to other institutions and to other segments of the aviation industry that were considering the establishment of similar activities. Five bulletins were issued in the series. Because of the popularity of two of them, those on the ground-school and flight operations, the supply was soon exhausted.

The Link Foundation has again provided funds for the publication of this bulletin, which combines and brings down to date the information of the two former bulletins. This bulletin attempts to give the basic information necessary to organize and operate the ground and flight activities necessary for a well-rounded and academically-sound program of instruction for both the amateur and the professional pilot. While the aim has been to provide general information, frequent reference is made to the program of the University of Illinois for illustrative purposes.

In the preparation of the material, Mr. Glen L. Amundson, formerly of the Institute staff, and Mr. Eugene L. Haak, ground-school supervisor, and Mr. Jesse W. Stonecipher, chief flight instructor, presently of the Institute staff, have been most helpful.

On January 1, 1959, the Civil Aeronautics Administration will be absorbed into the Federal Aviation Agency. C.A.A. references will then probably become F.A.A. references, C.A.A. manuals probably will be F.A.A. manuals, etc. Those changes will not materially affect the contents of this bulletin.

In this monograph, as in all publications of the Institute, the author has had complete freedom to express his opinions, with the understanding that he will assume sole responsibility therefor.

July 1958

LESLIE A. BRYAN, *Director*

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Flight and Preflight Curricula

For convenience, an instruction program for pilots can be divided into two parts — the ground or preflight instruction and the in-flight instruction. It is best to give the instruction on a coordinated basis. One way to do this is to have a three-hour ground instruction session one night a week. Another way is to have one-hour ground sessions on alternate days with the flight instruction. Part I will discuss the ground instruction and Part II will cover the flight instruction. The emphasis is, in each case, on college- or university-type programs.

Part I — Ground-School Instruction

Ground or preflight instruction is an integral part of any aviation flight program. The Civil Aeronautics Administration (C.A.A.) requires applicants for Private Pilot and Commercial Pilot certificates to pass written “aeronautical knowledge” examinations. Such instruction can be taught more economically and more efficiently in the classroom than in individual student-instructor conferences. The subject matter is comprehensive enough so that the content of the course can be taught at the college level. This is true of the ground-school materials for both the Private Pilot and Commercial Pilot certificates as well as for the other certificates and ratings.

AIRMAN AGENCY CERTIFICATES

The C.A.A. issues the Airman Agency Certificates for Basic (Private Pilot) Ground Schools and Advanced (Commercial Pilot) Ground Schools as provided for in Part 50 of the Civil Air Regulations. Airman Agency Certificates are also required when an Instrument Flight School or a Flight Instructor School is established. Civil Aeronautics Manual 50 (C.A.M. 50), available from the Superintendent of Documents, U. S. Government Printing Office, contains material which interprets and explains the requirements that are specified in Part 50 of the Civil Air Regulations. Both Civil Air Regulations and the Civil Aeronautics

Manuals are constantly being revised to meet the needs of changing conditions. It is therefore important that anyone setting up an aviation curriculum, which is subject to approval by the C.A.A., be cognizant of the current regulations and interpretations. The status of Civil Air Regulations and Manuals can always be ascertained by requesting this information from the C.A.A., Washington 25, D. C.

UNIVERSITY CREDIT

At the University of Illinois, students receive their credits and grades because of their work in ground school. A student's flying is considered in much the same light as laboratory work in a science course. The reward for the student's successful passing of his flight test is his C.A.A. certificate. His reward for successful ground-school work is his course credit and his grade. Such a system tends to maintain scholastic standards and enables the ground instructor to cover adequately more material than is required by the C.A.A. No one, however, is permitted to take ground school for credit without flight, or vice versa. In the very rare case in which the flight instructor recommends that a student not continue with his flying, the student is allowed to continue in the ground school and receives full credit if he passes the course.

CLASS SCHEDULE COORDINATION

The ground school coordinates its activities with the other units within the University by scheduling its classes to make for a minimum loss of time in taking the flight instruction. Ground school is taught on the campus on the same time-table arrangement as the other University course offerings. The student ordinarily takes ground-school instruction on a Monday-Wednesday-Friday sequence for a 50-minute period, and his flight training on a Tuesday-Thursday-Saturday sequence. Since the airport is about six miles from the University, the students are transported there by University bus. The bus leaves for the airport 10 minutes after campus classes are over and returns from the airport in time to allow a student to attend classes which begin one hour and 50 minutes after he left the campus. This time allowance gives the student adequate time for transportation, for a 15-minute period before and after his flight training for a discussion with his flight instructor, and for an hour of flight instruction. Since ground school is group instruction and flight training is individual instruction, the best utilization of student and instructor time is by an arrangement such as the above, rather than by an attempt to give ground school at the airport followed immediately by flight instruction. When possible, ground-school subjects are introduced at a time which will coincide with the student's flight training. Civil Air Regulations (C.A.R.), for example, is taught early in Aviation 101

because every student must pass a prescribed examination in C.A.R. before his first solo flight.

The ground-school curriculum complements the flight curriculum. The major problems occur in coordinating the subject matter in ground school with the activities in flight training. Since flight operations slow down or speed up with the weather, students may finish their flight work before they finish the ground-school course. Flight instructors also attempt to complete their students' flight training before final examination week. Usually the C.A.A. wishes to have the written "aeronautical knowledge" examination concluded before the flight test is given. However, if the ground-school instruction is as intensive as a university would normally give, the C.A.A. may be willing to allow the flight examination to be given prior to the final examination in ground school, which normally is scheduled with the rest of the university examinations. It is necessary to coordinate this matter with the C.A.A. unless, as at the University of Illinois, the C.A.A. has accredited the university to formulate and to give its own examinations and then to certify to the C.A.A. those students who have successfully completed the course.

INSTRUCTOR QUALIFICATIONS

At the University of Illinois, a ground-school instructor must possess at least a bachelor's degree and have the personal and professional qualifications which meet the approval of the Board of Trustees. It is desirable that ground-school instructors hold a Commercial Pilot certificate. C.A.M. 50 requires ground-school instructors to hold a Ground Instructor certificate with ratings appropriate to the subjects to be taught, or else to work directly under a principal instructor holding the certificate and the necessary ratings. The current ground-school instructor ratings are navigation, aircraft, meteorology, aircraft engines, Civil Air Regulations, radio navigation, and Link trainer operator. Persons seeking the C.A.A. Ground Instructor certificate must take the subject examinations by making arrangements with the nearest C.A.A. safety agent. One ground-school staff member can teach 15 scheduled classroom-hours per week during the regular semester and 18 classroom-hours per week during the summer. This is, however, above the 12-hour teaching load suggested by experience as being desirable.

Salaries for ground instructors range from \$600 monthly upwards.

CLASSROOM FACILITIES

C.A.M. 50 clearly defines the minimum classroom facilities required for all C.A.A. approved ground schools. These requirements are easily met by educational institutions, since nothing unusual is required in the way of desks, blackboards, illumination, etc. Classroom equipment neces-

AIRCRAFT

FLIGHT TRAINING

GROUND INSTRUCTION

COURSES

Avi. 101 Private Pilot Prepares student for C.A.A. Private Pilot certificate. Credit 3 hours. Fee \$300	48 hours 1. Civil Air Regulations 2. Aerial Navigation 3. Radio 4. Meteorology 5. General Service of Aircraft	38 hours + 13 hours flight discussion DAY Dual 18 Solo 10 Observer 6 Link 11 NIGHT Dual 2 Observer 2	Two-Place Tandem Monoplane
Avi. 102 Secondary Second step toward a C.A.A. Commercial Pilot certificate. Credit 3 hours. Fee \$300	48 hours 1. Aircraft Engines 2. Meteorology	44 hours Dual 6 Solo 16 Dual 10 Solo 12	Two-Place Side-by-Side Monoplane Two-Place Tandem Biplane
Avi. 103 Intermediate Third step toward a C.A.A. Commercial Pilot certificate. Credit 3 hours. Fee \$300	48 hours 1. Aerial Navigation 2. Radio Communications 3. Cross-Country Flight	44 hours CROSS-COUNTRY DAY Dual 8 Solo 20 NIGHT Dual 3 Solo 0 INSTRUMENT Flight 5 Link 5 Dual 1 Solo 2	Two-Place Side-by-Side Monoplane and Two-Place Tandem Monoplane
Avi. 104 Advanced Final step toward a C.A.A. Commercial Pilot certificate. Credit 3 hours. Fee \$300	48 hours 1. Civil Air Regulations 2. Aircraft 3. Review for C.A.A. Commercial Pilot's Written Examination	44-49 hours Dual 14-19 Solo 30	Two-Place Tandem Monoplane and Four-Place Monoplane
Avi. 205 Flight Instructor Prepares commercial pilot for C.A.A. Flight Instructor certificate. Credit 3 hours. Fee \$300	48 hours 1. Techniques of Flight Instruction 2. Theory of Flight	26-32 hours Dual 5 Solo 6 Instructor Practice 15	Two-Place Tandem Monoplane
Avi. 206 Basic Instrument Flight Techniques First course in preparing the commercial pilot for C.A.A. instrument rating Credit 3 hours. Fee \$300	48 hours 1. Theory of Instrument Flight 2. Civil Air Regulations 3. Meteorology 4. Navigation	30-34 hours Dual 20-22 Link 10-12	Four-Place Monoplane
Avi. 207 Advanced Instrument Flight Procedures Second and final course leading to C.A.A. instrument rating Credit 3 hours. Fee \$300	48 hours 1. Instrument Flight Publications and References 2. C.A.A. Air Traffic Control System 3. Meteorology 4. Preparation for C.A.A. Instrument Written Examination	Dual 20-25 Link 10-12	Four-Place Monoplane

sary for the Basic Ground School requirement includes only the texts and the related source materials which cover the subjects listed in C.A.M. 50. However, it is desirable to have available as much as possible of the Advanced Ground School equipment, which is listed also in C.A.M. 50, even though only a Basic Ground School is in operation. Colleges and universities which have flight programs and which own their own aircraft, or have aeronautical engineering courses, easily meet the equipment requirements of C.A.M. 50, since they already have many of the required aircraft components prepared for student research and operation. Extra equipment, which is not required but which may be used to good advantage, includes the following: a classroom model of the E-6B computer,



Aviation 102 students investigate meteorology problems.

obtainable from Weems Navigation Service, Annapolis, Maryland; a model wind tunnel from Aero Publishers, Incorporated, Los Angeles, California; a set of Linguaphone records for teaching Morse code; a Link Aviation, Inc., type radio range simulator; and charts from various instrument manufacturers showing cutaway views of their products. Such extra equipment can be obtained at an estimated total cost of \$125.

It is both economical and acceptable to hold the private pilot and the commercial pilot ground-school instruction in the same classroom.

This room should be equipped with dark shades and with a screen so that movies and slides may be presented. Space should also be available for other teaching aids such as mock-ups and charts.

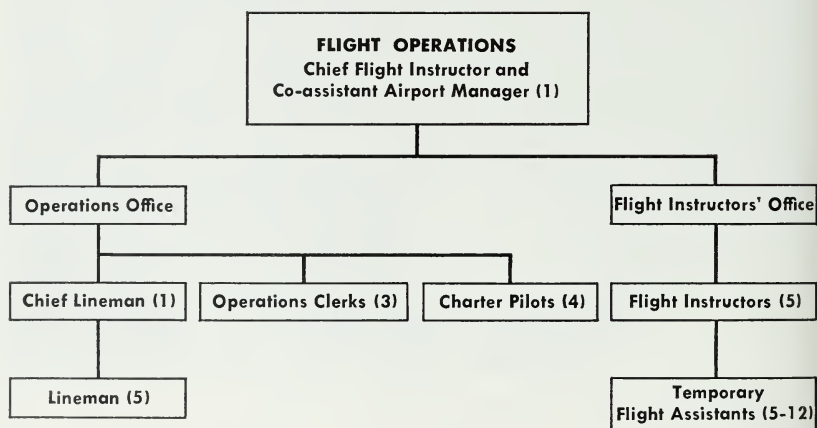
SUMMARY OF AVIATION COURSES

The chart on page 8 is a summary of the aviation courses involving flight training which are currently being given by the University of Illinois. The appendix gives a more comprehensive summary of the content of the ground-training courses.

Part II — In-Flight Instruction

ORGANIZATION

The flight operations department of the Institute of Aviation, under the direct supervision of the chief flight instructor, is responsible for all activities directly associated with flight instruction. As indicated on the organization chart, these activities are broadly divided into two categories: (1) operations and (2) flight training. Operations is a service unit; flight training is a teaching unit. The following chart shows the line organization and staff within each unit.



OPERATIONS OFFICE

The operations office handles (1) line service to itinerant and scheduled aircraft, (2) the sale of gasoline, oil, and other products, (3) hangar space on a rental basis, (4) aircraft rental to students and staff members, (5) charter air service for the University faculty and staff, (6) aerial photography, and (7) other miscellaneous activities.

At the University of Illinois Airport, the operations office is under the supervision of the chief flight instructor, who also acts as the co-assistant



Operations Office, showing the flight planning room in the background.

airport manager. It employs three operations clerks, five linemen, and four instructors whose primary duties are charter flying. The office is kept open 24 hours every day in the year by having the clerks on an alternating shift for week ends and the linemen on rotating shifts covering a 24-hour period. It also serves as the coordinating agency with other units of the University in matters involving flight.

Very close coordination between the flight-operations staff and the field-maintenance and aircraft-maintenance groups is necessary. The operations office becomes a reporting agency on such things as runway defects, malfunctioning of field lighting, and needed aircraft repairs.

Supplies and equipment — In an operation such as that at the University of Illinois Airport, the following supplies and equipment should be available for use by the office personnel:

- 3 filing cases
- 2 or 3 desks and chairs
- 1 sales-ticket machine
- 1 adding machine
- 1 cash drawer or register
- 2 typewriters

These involve an investment of \$1,800 upwards. It is well to remember that equipment and supplies can be built up over a period of time, thus decreasing the amount of the original investment necessary to start operations.

The following additional equipment is desirable:

- 1 Unicom station, if there is no C.A.A. tower on the field
- 1 radio receiver tunable between 200-400 kc. for weather reports
- 1 wind-dial (wind direction and velocity indicator)
- 1 wall map composed of aeronautical sectional charts
- 1 mobile gas truck
- 1 combination crash truck and fire truck
- 12 miscellaneous tools (screw drivers, pliers, etc.) for linemen's use
- 12 flashlights (if 24-hour service is available)
- 6 checkered flags for vehicles used on the aeronautical-use areas
- 2 loading ramps for large aircraft
- 1 tug for large aircraft
- 1 auxiliary power unit for aid in starting aircraft
- 1 portable engine preheater, if required by climatic conditions
- 1 showcase for display of materials for resale to itinerants (maps, log-books, goggles, etc.)

The estimated cost of the above is \$8,000 upwards.

Office space — An operations office should be large enough to accommodate at least two desks, filing cabinets, and other miscellaneous office equipment. It is desirable to have a waiting room, or transient-pilot lounge, of reasonable size to accommodate a wall map and a rack for an *Airman's Guide*, an *Airport Directory*, a *Transient Register*, a *Flight Information Manual*, *Jeppesen Manuals*, weather information board, etc. The minimum space recommended for an operations office of this type is 30 feet by 20 feet.

It is also desirable to provide office and desk space for the linemen. This space should be convenient to the ramp area and should be large enough to accommodate the linemen and the small equipment necessary to line service (not including loading ramps, gas trucks, etc.). The minimum space recommended is approximately 15 feet by 10 feet.

Ramp or line area — An adequate ramp or tie-down area will vary considerably, depending upon the number of airplanes using the field. Some form of permanent tie-downs must be provided in this parking area. A regular check of these areas should be included in the lineman's activities.

Delegation of responsibility — In view of the many and varied services performed by operations office personnel, it is imperative that the duties

and areas of responsibility be specifically set forth. The only completely satisfactory solution is to provide written instructions for all personnel.

CHIEF FLIGHT INSTRUCTOR

Under the Director of the Institute of Aviation, the chief flight instructor is responsible for (1) planning, organizing, and administering all flight-training courses, (2) supervising all nontraining flight activities, (3) providing service, assistance, and advice, through the operations office, to transient and field-based pilots, and (4) assisting in the routine management of the airport.

A baccalaureate degree, or higher, from a recognized college or university, preferably in education or commerce, is desirable. The C.A.A. Commercial Pilot and Flight Instructor certificates and instrument rating are mandatory. It is also desirable that the chief flight instructor have the following other qualifications: extensive experience in flight instruction; extensive practical experience in aerial navigation and meteorology, including elementary forecasting; elementary knowledge of radio and experience with various aircraft radios; thorough knowledge of the Civil Air Regulations; some supervisory experience; ability to deal harmoniously with faculty, students, and the general public; mature judgment; knowledge of efficient office procedures; tact; dependability; and a pleasing personality.

Salaries for a chief flight instructor range from \$600 monthly upwards, depending upon the experience desired and the size of the operation.

FLIGHT INSTRUCTORS

Under the direction of the chief flight instructor, the flight instructors give that part of the courses involving flight and are responsible for such other duties as may be assigned.

A flight instructor should possess a baccalaureate degree from a recognized college or university, as well as the C.A.A. Commercial Pilot and Flight Instructor certificates, an instrument rating, and experience in flight instruction. The following other qualifications are also desirable: C.A.A. Ground Instructor certificate; ability to deal harmoniously with faculty, students, and the general public; good judgment; a pleasing personality; and a good personal appearance.

Salaries for flight instructors range from \$500 monthly upwards.

FLIGHT ASSISTANTS

Under the direction of the chief flight instructor, the flight assistants give flight instruction.

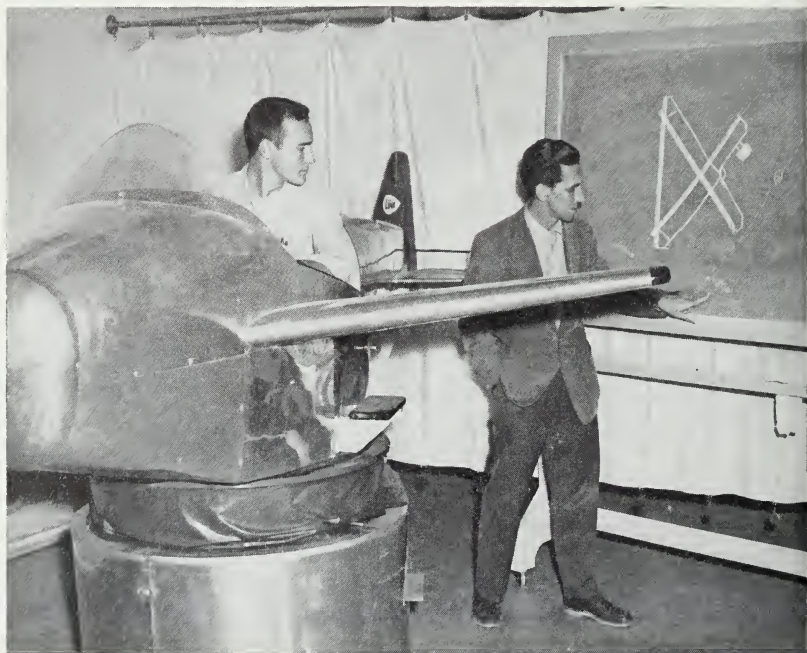
Flight assistants should possess the same qualifications as flight instructors with respect to C.A.A. certificates and ratings; however, they do not necessarily have to meet the degree requirement.

Many of the flight assistants are employed on a part-time basis and salaries are adjusted accordingly. The monthly salary for a full-time flight assistant ranges from \$375 upwards.

CHARTER PILOTS

Under the chief flight instructor, the charter pilots (1) act as pilots for the charter aircraft, (2) promote the utility aspect of aviation, (3) occasionally instruct students, and (4) perform flight duties incidental to research problems in aviation.

Qualifications for the charter pilot should include the following: a baccalaureate degree from a recognized college or university; C.A.A. Commercial Pilot and Flight Instructor certificates and instrument rating; extensive experience in all phases of cross-country flying; extensive knowl-



An Aviation 101 student simulating flight in a School Link.

edge of aerial navigation, elementary weather forecasting, radio procedures, and both instrument and visual flight rules; some knowledge of and appreciation for acceptable research techniques; mature judgment; pleasing personality; ability to handle delicate flight situations with tact; and a good personal appearance.

The salary range for charter pilots starts at \$600 monthly.

CHIEF LINEMAN

Under the general supervision of the chief flight instructor, the chief lineman supervises and is responsible for the performance of duties incidental to the moving, parking, and servicing of aircraft, including washing and minor mechanical maintenance work. He supervises and trains linemen and assists in the preparation of their schedules. He acts for the chief flight instructor in his absence in matters relating to line operations and assists the linemen in the performance of such duties as the following: moving aircraft in and out of hangars; directing incoming aircraft to service pits; fueling gas tanks; cleaning windshields; recording and collecting for gas and oil sales; guiding transient aircraft to tie-downs; doing routine work on aircraft flight lines; guarding and protecting airport buildings and aircraft; and aiding transient flyers. He also performs any related duties which may be assigned to him.

The chief lineman should be a high-school graduate and have supervisory ability and experience. Preferably, he should have two years of experience as a lineman.

Starting salaries for chief linemen are about \$350 monthly.

LINEMEN

Under the direct supervision of the chief lineman, the linemen perform the duties incidental to the moving, parking, and servicing of aircraft, including washing and minor mechanical maintenance work. They move aircraft in and out of hangars, direct incoming aircraft to service pits, fuel gas tanks, clean windshields, record and collect for gas and oil sales, direct transient aircraft to tie-downs, do routine work as assigned on aircraft flight lines, guard and protect airport buildings and aircraft, aid transient flyers, and perform related duties as assigned.

The lineman should be a high-school graduate with a pleasing personality and a willingness to serve.

Monthly salaries for linemen range from \$300 upwards.

OPERATIONS CLERKS

Under the general supervision of the chief flight instructor, the operations clerks are responsible for varied and complex clerical work involving the exercise of independent judgment. They supervise and direct the work of a small or moderate-sized clerical unit, compile data for reports, code, classify, file, and direct the filing of all materials in the filing system, give out information as approved by the supervisor, answer routine inquiries, assist in the preparation and maintenance of records, including tabulations and the posting of data in various record books, control admission of visitors, operate office machines as required and instruct others in the operation of such machines, prepare materials for mailing, handle cash and other valuables, keep expenditures and income accounts

which may include the auditing, vouchering, and scheduling of invoices, payrolls, and expense accounts, and perform related duties as assigned.

The operations clerk should be a high-school graduate with business training and should have clerical and typing ability as well as one year of clerical experience.

Salaries for operations clerks range from \$200 upwards.

FLIGHT PLANNING ROOM

A flight-planning room is a necessity for the use of transient pilots as well as for students. Included in the equipment of this room should be a large wall aeronautical chart upon which air distances can be measured and from which visual planning for the use of the established runways can be made. Desk space should also be provided upon which charts can be laid while the pilot is plotting his course and filling out a flight plan. A bulletin board is also a practical necessity. Other desirable equipment includes telephone connection with the Air Traffic Communication stations and the local traffic control tower. It is desirable also to have available in the planning room copies of the *Airman's Guide*, weather sequence reports, and an atlas. Size of this room varies with the number of people using it. For an hourly load of approximately 20 persons, a space about 18 feet square is quite satisfactory at the University of Illinois Airport. Equipment can be simple and need not cost more than \$50 to \$100.

FLIGHT INSTRUCTORS' OFFICE

Office space—The flight instructors' office should provide sufficient space for desks and lockers for each permanent flight instructor. A ready room for instructor-student meetings and conferences should also be provided in an area which is convenient to the flight instructors' office. The ready room should be large enough to accommodate all flight gear, parachutes, handiphones, airplane control records, student flight records, bulletin boards, conference tables, airport diagrams, and other items necessary and incidental to flight training. If possible, a Link trainer room should also be located in close proximity to the flight office. Approximately 100 square feet per instructor should be allowed for the flight instructors' office and 800 square feet for the ready room, assuming that parachutes, logbooks, and sign-out clip boards are kept there and the student load is 10 to 15 students an hour.

Supplies and equipment—the following supplies and equipment should be available in the flight instructors' office:

- 1 desk and chair for each permanent flight instructor
- 1 locker for each permanent flight instructor
- 1 intercom system for each flight instructor (handiphone or its equivalent)

- 1 conference table and 4 chairs
- 1 filing cabinet for student logbooks
- 2 or 3 filing cabinets for mimeographed material
- 1 typewriter
- 1 bulletin board
- 1 aeronautical wall chart
- 1 parachute rack
- 2 parachutes of an approved type for each flight instructor
- 1 duplicating machine

The total cost of similar supplies and equipment will run from \$1,200 upwards. Like other supplies and equipment, the above can be acquired over a period of time.

AIRCRAFT REQUIREMENTS

A complete flight program — private, commercial, flight instructor, and instrument — should provide sufficient airplanes to meet the requirements of C.A.M. 50. Minor changes are made periodically in these requirements, so the latest edition should be consulted. C.A.M. 50 lists only the minimum requirements in this regard. It is desirable to provide as wide a variety of aircraft makes, in the lightplane category, as pos-



The University of Illinois owns and operates a fleet of 40 aircraft.

sible. In general, C.A.M. 50 states that an approved school should meet the following aircraft requirements:

Private pilot course: (1) At least one airplane for every 15 students; (2) the airplane must be capable of carrying two persons and two parachutes without exceeding the gross weight limitations of the airplane; and (3) the airplane must be suitable for performing the maneuvers necessary to accomplish the flight test for a private pilot certificate.

Commercial pilot course: (1) All airplanes must be in excess of 50 horsepower; (2) both tandem and side-by-side seating arrangements must be represented; (3) at least one airplane must be equipped with wing flaps, two-way radio, controllable propeller, and a manifold pressure gauge; (4) at least one airplane must be properly equipped for visual night flying (see C.A.R. Part 43); and (5) although not required for the commercial course, an airplane suitable for simulated instrument flying should be provided to meet the unrestricted commercial pilot requirements.

Flight instructor course: The airplanes which are used in the commercial course are satisfactory for a flight instructor course.

Instrument course: The airplane must be equipped in accordance with C.A.R. Part 43 pertaining to Instrument Flight Rules (IFR). Such aircraft must be equipped with a suitable hood which will completely exclude all outside visual reference to the pilot but which will not restrict the vision of the safety pilot or instructor. The airplane must be capable of maintaining a climb of 300 f.p.m. at 2,000 feet above ground elevation and must be capable of performing all maneuvers listed in C.A.R. Part 20.42.

New aircraft satisfactory for the elementary courses can be purchased for \$6,000 upwards. Satisfactory second-hand aircraft can be purchased as low as \$1,000.

AIRPORT REQUIREMENTS

The airport used for flight-training purposes must meet the minimum requirements of C.A.M. 50. Briefly, these requirements are: (1) minimum runway length, 1,500 feet at sea level, and minimum width, 200 feet; (2) runways located and oriented to permit 95 per cent usage with crosswind components of less than 15 m.p.h.; (3) minimum approach angles to permit a 20-to-1 glide path; (4) runway grades with an unobstructed view 5 feet above the runway for a distance of 500 feet plus one half of the runway length; and (5) lighting facilities in accordance with Appendix D of the C.A.R. where night flying is required.

HANGAR FACILITIES REQUIREMENTS

Hangar requirements are listed in C.A.M. 50 and, in general, are as follows: (1) a hangar of permanent construction and (2) a hangar that is adequate to house *all* flight equipment when not in operation. A rough estimate can be made as to the amount of hangar floor space required by allowing 500 square feet for each light aircraft. By careful hangaring or by the use of nose-cradles, this figure can be cut in half.

PARACHUTE REQUIREMENTS

C.A.M. 50 provides that a minimum of two approved types of parachutes should be provided, with at least two parachutes per instructor.

Such additional parachutes as are necessary to prevent undue delay in normal flight-training progress should also be available. Parachutes sell from \$200 upwards. Repacking, which must be done every 60 days to keep the parachutes legally acceptable, costs about \$6 for each parachute.

MAINTENANCE PERSONNEL

Sufficient C.A.A. certificated personnel must be employed to maintain the aircraft used for flight instruction in complete airworthy condition at all times. No more than five uncertificated persons may be under the supervision of one certificated mechanic at any time. As an average, one mechanic with a helper can care adequately for four well-utilized training-type light aircraft, although the rule of thumb varies with the degree of utilization of the aircraft.

FLIGHT PERSONNEL

Flight personnel in the Institute of Aviation, whose duties are flight instruction, includes five flight instructors and, depending upon the enrollment, from five to 12 temporary flight assistants. Each person giving flight instruction must possess valid Commercial Pilot and Flight Instructor certificates and pertinent ratings. A flight instructor employed to teach instrument flying must possess a valid instrument rating. These are the *minimum* requirements established by C.A.M. 50. At the University of Illinois, a flight instructor must also possess at least a baccalaureate degree from a recognized college or university.

One flight instructor can teach from nine to 18 students on the semester plan if flight sections are scheduled on a basis of five and one-half days per week. The variation in number of students per instructor depends upon whether the students are private or commercial students. Instructors are generally assigned an average of 12 or 13 students per semester. The C.A.R. provides that instructors should not fly more than eight hours in any one day nor more than 36 hours each week.

FLIGHT CURRICULUM

A school may elect to follow the curriculum which is outlined in C.A.M. 50 or may submit its own detailed curriculum for approval by the C.A.A. At the University of Illinois all courses are detailed in syllabus form. Each student is given a copy of the syllabus pertinent to the course in which he is enrolled. The Institute of Aviation syllabi are not in complete conformity with C.A.M. 50 but they have been approved by the C.A.A. In addition to the syllabus, the manual given to the student should include detailed instructions and regulations pertinent to his activity at the airport, airport diagrams, traffic rules, practice area diagrams, general cross-country flight information, aircraft operations data, etc. Some of the above information as set up in the Institute of Aviation's Student Manual is included in the Appendix.

SUGGESTED FLIGHT-TRAINING TIME TABLE

The time table or schedule of flight courses at the University of Illinois for a representative semester is as follows:

Courses offered by the Institute of Aviation are open to students and faculty in all departments of the University, subject to limitations imposed by the availability of flight equipment. Credit for the majority of Institute of Aviation courses is general University credit; its use as credit toward graduation is a matter upon which each college or school must pass.

The fee for each Institute of Aviation flight course is \$300. Transportation to and from the Airport is provided by the Institute. Arrangements for the physical examination for students in Avi. 101 are made by the Institute through the University Health Service upon final acceptance in the course. Students in Avi. 104 are required to possess a second-class C.A.A. medical certificate dated within the preceding 12 calendar months.

Students are cautioned that all times at the Airport listed in the following schedules refer to airborne time and that a minimum of 30 minutes must be allowed for traveling to the Airport prior to each flight and for returning to the campus after each flight. The Institute provides regular bus service without charge between the Airport and the campus. The bus leaves the campus from the corner of Burrill and Green and makes regular stops at Sixth and Gregory, and First and Gregory. For convenience in arranging program cards so that travel time to and from the Airport will not cause overlapping of classes, the bus schedule is combined with the flight section times as follows: The column labeled "Leave Campus" indicates the time the bus departs for the Airport; the column labeled "Hours" indicates airborne time from ground to ground; and the column headed "Arrive Campus" lists the time students may expect to be back on the campus.

COURSES

AVI. 101. PRIVATE PILOT. Prepares the beginning flight student for a Civil Aeronautics Administration Private Pilot certificate. Airplane utility is emphasized. Forty-eight classroom hours of preflight (ground-school) work on Civil Air Regulations, aerial navigation, radio, meteorology, and general service of aircraft; 13 hours of flight discussion; 11 hours of Link training; and 38 hours of flight training in various makes of airplanes.

CREDIT	SECTION	HOURS	DAYS	ROOM	INSTRUCTOR
3 hours	Preflight A	8	TTS	11 Aero. Lab. B	Haak
	Preflight B	2	MWF	11 Aero. Lab. B	Haak
FLIGHT	HOURS	DAYS	LEAVE CAMPUS	ARRIVE CAMPUS	
A1	8:00-9:00	MWF	7:30 a.m.	9:45 a.m.	Staff
	9:20-10:20	W	7:30	11:00	
A2	10:40-11:40	MWF	10:00	12:45 p.m.	
	9:20-10:20	F	8:55	12:45	
A3	12:20-1:20	MWF	11:55	1:55	
	4:30-5:30	M	4:00 p.m.	5:55	
A4	1:40-2:40	MWF	1:10	3:00	
	4:30-5:30	W	4:00	5:55	
A5	3:00-4:00	MWF	2:20	4:45	
	4:30-5:30	F	2:20	5:55	
B6	8:00-9:00	TTS	7:30 a.m.	9:45 a.m.	
	9:20-10:20	Tu	7:30	11:00	
B7	10:40-11:40	TTS	10:00	12:45 p.m.	
	9:20-10:20	Th	8:55	12:45	
B8	12:20-2:40	TT	11:55	3:00	
B9	3:00-5:20	TT	2:20 p.m.	5:55	

AVI. 102.† SECONDARY FLIGHT TRAINING. A continuation of the training of the private pilot. The purpose is to develop further the qualities of a good pilot. Aerobatics are emphasized. Additional ground-school training in meteorology and aircraft engines is presented. Forty-eight classroom hours of preflight (ground-school) work and 44 hours of flight training (16 dual and 28 solo) in two-place side-by-side monoplanes and two-place tandem biplanes. Prerequisite: Avi. 101 or Private Pilot certificate; consent of Director.

3 hours Preflight 3 MWF 11 Aero. Lab. B Haak

The same flight sections listed under Avi. 101 are available for Avi. 102 students with the exception of Flight A5.

AVI. 103.† INTERMEDIATE FLIGHT TRAINING. The third phase of flight training in preparation for a C.A.A. Commercial Pilot certificate. Emphasis is placed on cross-country, night, and instrument flying. Forty-eight classroom hours of preflight (ground-school) training in radio, aerial navigation, and use of the E-6B computer, and 44 hours of flight training (17 dual and 27 solo) in two-place side-by-side radio-equipped aircraft and two-place tandem monoplanes. This course may be taken by private pilots who wish to increase their cross-country and night-flying proficiency. Prerequisite: Avi. 101 or Private Pilot certificate.

3 hours Preflight 10 MWF 11 Aero. Lab. B Haak

FLIGHT	HOURS	DAYS	LEAVE CAMPUS	ARRIVE CAMPUS	INSTRUCTOR
A2	12:20-5:20	M	11:55 a.m.	5:55 p.m.	Staff
B4	12:20-5:20	Tu	11:55	5:55	
A6	12:20-5:20	W	11:55	5:55	
B8	12:20-5:20	Th	11:55	5:55	
A10	12:20-5:20	F	11:55	5:55	
B11	8:00-12:00	S	7:30 a.m.	12:45	

AVI. 104.† ADVANCED FLIGHT TRAINING. The final phase of flight-training preparation for a C.A.A. Commercial Pilot certificate. Emphasis is placed on precision flying. Forty-eight classroom hours of preflight (ground-school) work devoted to aircraft and a review of Civil Air Regulations, aerial navigation, meteorology, aircraft and aircraft engines, and radio aids to navigation in preparation for written and flight phases of the C.A.A. examination for a Commercial Pilot certificate, 44 hours of flight training (14 dual and 30 solo) in two-place tandem monoplanes, or four-place monoplanes. Prerequisite: Avi. 102 and 103; consent of Director.

3 hours Preflight 10 TTS 11 Aero. Lab. B Haak

The same flight sections listed under Avi. 101 are available for Avi. 104 students with the exception of Flight B7.

COURSES FOR ADVANCED UNDERGRADUATES

AVI. 205.† FLIGHT INSTRUCTOR COURSE. Prepares the commercial pilot for a C.A.A. Flight Instructor certificate. Forty-eight classroom hours of preflight (ground-school) work on techniques of flight instruction and theory of flight, and a minimum of 26 hours of flight training (20 dual and 6 solo) in two-place tandem aircraft. Prerequisite: Commercial Pilot certificate; junior standing; consent of the Director.

3 hours Preflight 8 MWF Airport Stonecipher

The same flight sections listed under Avi. 101 are available for Avi. 205 students with the exception of Flights A1 and A2.

AVI 206.* BASIC INSTRUMENT FLIGHT TECHNIQUES. First course in preparing the commercial pilot for a C.A.A. instrument rating. Forty-eight hours of preflight (ground-

† Avi. 102 and 103, or 103 and 104, or 104 and 205 may be taken concurrently by special permission.

* Offered in alternate semesters. The same flight sections listed under Avi. 101 are available for Avi. 206 and Avi. 207 students with the exception of Flight A1.

school) training on theory of instrument flight, Civil Air Regulations, basic dead-reckoning and radio navigation, and aviation meteorology; 20 to 22 hours of simulated instrument flight and 10 to 12 hours of instrument Link training. Prerequisite: Commercial Pilot certificate, or equivalent flight experience; junior standing; consent of the Director.

3 hours Preflight 8 MWF 11 Aero. Lab. B Peterson

AVI. 207.* ADVANCED INSTRUMENT FLIGHT PROCEDURES. Second and final course leading to a C.A.A. instrument rating. Forty-eight classroom hours of preflight (ground-school) training on instrument flight publications and references, C.A.A. Air Traffic Control System, advanced aviation meteorology, and preparation for the C.A.A. examination for instrument rating; 20 to 25 hours of simulated instrument flight and 10 to 12 hours of instrument Link training. Prerequisite: Avi. 206, or 40 hours of simulated instrument flight experience; junior standing; consent of the Director.

3 hours Preflight 8 MWF 11 Aero. Lab. B Peterson

AVI. 292. SPECIAL RATING (MULTI-ENGINE LAND). Prepares the commercial pilot for a C.A.A. multi-engine land airplane rating. Sixteen classroom hours of preflight (ground-school) work and 15 hours of flight training in a multi-engine land airplane. Prerequisite: Commercial Pilot certificate; consent of the Director.

1 hour To be arranged

BUS SCHEDULE

The following bus schedule will be in effect on all flying days. The bus leaves campus from the corner of Burrill and Green and makes regular stops at Sixth and Gregory, and First and Gregory.

LEAVE CAMPUS — ARRIVE AIRPORT

7:30 a.m.	7:45 a.m.
8:55	9:10
10:00	10:15
11:00	11:15
11:55	12:10 p.m.
1:10 p.m.	1:25
2:20	2:35
3:10	3:25
4:00	4:15
5:00	5:15

LEAVE AIRPORT — ARRIVE CAMPUS

7:50 a.m.	8:05 a.m.
9:30	9:45
10:40	11:00
11:30	11:45
12:30 p.m.	12:45 p.m.
1:40	1:55
2:45	3:00
3:40	3:55
4:30	4:45
5:40	5:55

STUDENT RECORDS

A record of the student's flying time is kept in a flight record book which is provided by the University. This record is the property of the school until the student completes the course. Upon completion of the course the student signs a Cumulative Student Flight Record sheet and is given his flight record book. The cumulative record remains on file with the University as a permanent record.

Sample pages from the flight record used at the University of Illinois and a copy of the Cumulative Student Flight Record are contained in Appendixes A and B.

* Offered in alternate semesters. The same flight sections listed under Avi. 101 are available for Avi. 206 and Avi. 207 students with the exception of Flight A1.

Appendixes

UNIVERSITY OF ILLINOIS

INSTITUTE OF AVIATION

FLIGHT RECORD

COURSE _____ Section _____ Group _____

STUDENT _____ Certificate No. _____

Home Address _____ Home Phone _____

IN CASE OF ACCIDENT NOTIFY:

Name _____ Relationship _____

Address _____

Phone _____

INSTRUCTIONS FOR THE USE OF THIS FLIGHT RECORD

This Flight Record remains the property of the Institute of Aviation until the completion of the course and a Student Cumulative Flight Record is signed by the student. All entries must be in ink and carry the signature of the student, and, for dual flights, the signature of the instructor as well. An entry must appear in the Flight Record for every scheduled flight during the semester, whether the flight actually takes place or not. In the event of no flight, the reason the flight was missed must appear in the Flight Record, carrying the signature of the instructor and, except in cases of absence, the student. In the event that a student takes a flight other than that at his regularly scheduled time, the entry must be marked "EXTRA" in the space allotted to Flight Number.

The student's pilot and medical certificate will be stapled onto the back of the front cover and must remain there while the student is enrolled in any course in the Institute. The Flight Records are to be carried in the airplanes during flight and **MUST BE KEPT IN THE REGULAR FLIGHT RECORD RACKS AT ALL OTHER TIMES. THE FLIGHT RECORD MUST NOT BE TAKEN FROM THE READY ROOM EXCEPT FOR A REGULARLY SCHEDULED FLIGHT.** A Student Progress Chart appears on page three; it will be the responsibility of the instructor to keep this chart current, with all demonstrations designated with a "D" and from then on with the number grade appropriate. It is important that this Flight Record be filled out accurately and completely for it is the *only* record kept on student attendance, flight time, and progress in a course.

On all cross country flights where a landing is made at an airport other than the University of Illinois Airport, the student must secure the signature of the airport manager or operations clerk on the page where the cross country flight is entered.

UNIVERSITY OF ILLINOIS
INSTITUTE OF AVIATION
URBANA, ILLINOIS

GROUND INSTRUCTION

Before any flight instruction is started, ground instruction should be given the student in the following: (1) Familiarization with the airplane, (2) explanation of controls, (3) throttle, (4) instruments, (5) fuel system, (6) brakes, (7) instruction signals, (8) use of safety belts, and (9) location of fire extinguisher and first-aid kit. The student should also be instructed regarding local and special air traffic rules and warned regarding propeller danger and the starting and running of engines without some qualified person at the controls.

Above instruction given: Date..... Above instruction received:
..... (Cert. No.)
(Instructor) (Student)

PRIOR TO SOLO FLIGHT

Prior to solo flight, the student should also be given additional ground instruction on procedures and precautions to be observed in: (1) Swinging propellers, (2) starting engines, (3) warming up engines, (4) stopping of engines, (5) the line inspection of aircraft, (6) the use and care of parachutes.

Above instruction given: Date..... Above instruction received:
..... (Cert. No.)
(Instructor) (Student)

STUDENT PROGRESS CHART

Flight Number	2	5	9	14	16	17	18	19	21	23	24	27	29	39	41
Effect of Controls															
St & Level															
Coord Ex															
Confid Man															
C & C Turns															
G & G Turns															
P O Nml Stall															
P Off Nml Stall															
Climbing Turn Stall															
Gliding Turn Stall															
720 Deg Steep Turn															
Spin															
Takeoff															
Traffic Pattern															
Emerg on T.O.															
P On Compt Stall															
P On Partial Stall															
P Off Compt Stall															
P Off Partial Stall															
High Alt Emerg Procedures															
1080 Deg Overhead															
360 Deg Overhead															
180 Deg Overhead															
180 Deg Side															
90 Deg Side															
Slips															
Slow Flight															
Landings															
Cross Wind T.O.															
Cross Wind Landing															
1st Solo															
2nd Solo															
Accuracy Landings															
Wheel Landings															
Power Approach															
Pylon Eights															
Strange Airport															
Dragging a Field															
Flt Around Rest. Area															
Spirals															
Slips in Turns															
Slips to a Spot															

FLIGHT CHECK

Equipment Exam (Oral)_____ ()
 Preflight Check_____ ()
 Taxiing_____ ()
 Run-Up Check_____ ()
 Take Offs_____ ()
 Short or Soft Field Take Off_____ ()
 Climbs & Climbing Turns_____ ()
 Maneuvering min. speed_____ ()
 Stalls: P.Off Part_____ P.Off Nml_____ P.Off Cmpt_____ P O Part_____
 P O Nml_____ P O Cmpt_____ CTS_____ GTS XC_____ ()
 Turns around pylons_____ ()
 Airport traffic pattern_____ ()
 Accuracy approaches and spot landings_____ ()
 Landing technique_____ ()
 Cross wind T.O. & Landing_____ ()
 Cross-Country Flight Planning_____ ()
 Cross-Country Flying_____ ()
 Traffic control procedures_____ ()
 Maneuvering with engine out_____ ()
 Emergencies_____ ()
 Smoothness and coordination_____ ()
 Judgment_____ ()

Student_____ Date_____ Final Grade_____

Instructor_____ Check Pilot_____

Type of check IMTFC CPMTFC IRFC CAAFC

Appendix B

CUMULATIVE STUDENT FLIGHT RECORD: Semester _____ Course _____

Name _____ Age _____ Sex _____ College _____

Permanent address _____

Student's statement: I have accepted custody of my Flight Record book for the semester and course indicated in the upper right hand corner, and I certify that during the course I received flight training as follows: Dual _____ Solo _____ Link _____.

Certificate Number _____ Date _____ Signature _____

Avi. 101 — Semester _____

Instructor _____
 Dual required to solo _____ CAR written _____
 IMTG _____ CPMTG _____ IRG _____ CAAG _____
 Examiner _____
 Date PP cert. & ASEL rating rec'd _____

Aircraft			X-C
Dual			
Solo			
Total dual _____		Total solo _____	

Avi. 102 — Semester _____

Instructor _____
 Hours to solo 1 _____ Hours to solo 2 _____

Aircraft			
Dual			
Solo			
Total dual _____		Total solo _____	

Avi. 103 — Semester _____

Instructor _____

Aircraft			
Dual X-C-D			
Solo X-C-D			
Dual Lcl-N			
Solo Lcl-N			
Dual X-C-N			
Total dual _____		Total solo _____	

Avi. 104 — Semester _____

Instructor _____
 Written grades _____
 Instructor grade _____ CAA grade _____
 Examiner _____
 Date CP cert. rec'd _____
 Retakes _____

Aircraft			
Dual			
Solo			
Total dual _____		Total solo _____	

Avi. 205 — Semester _____

Instructor _____
 Written grades _____
 Instructor grade _____ CAA grades _____
 Inspector _____
 Date FI cert. rec'd _____
 Retakes (if any) _____

Aircraft			
Dual			
Solo			
Total dual _____		Total solo _____	

Avi. 206 — Semester _____

Instructor _____
 Written grades _____
 Instructor grade _____ CAA grades _____
 Inspector _____
 Date instrument rating rec'd _____
 Retakes _____
 Simulated instrument _____ Link _____
 _____ Semester _____
 Instructor _____
 Grades _____
 Date & rating rec'd _____

Aircraft			
Dual			
Solo			
Total dual _____		Total solo _____	

Additional information including accidents, forced landings, lost, etc.

This student's total dual is _____
 This student's total solo is _____

Appendix C — Aviation 101 Flight Syllabus (with Link Trainer)

ORIENTATION PHASE

Period 1. Thirty minutes discussion and 30 minutes School Link training.

Discussion of cockpit checkout in both airplane and School Link, forces on the airplane in flight, axis of rotation, function of controls, instruments, and trim tab. Discuss the similarity and differences in the airplane and the School Link.

Period 2. Thirty minutes discussion and 30 minutes dual.

Discuss preflight check, pretakeoff check, attitude references, straight and level flight, level turns, and use of section lines for straight flight.

Period 3. Thirty minutes discussion and 30 minutes School Link training.

Review of period 1. Discussion and practice of straight climbs and glides to specified altitudes, medium banked level turns of 45°, 90°, and 180°, climbing and gliding turns, and taxiing. Explain why the airplane turns, the use of the rudder in turns, carburetor heat control, relaxation in rough air, and forces on the airplane in turns.

Period 4. Thirty minutes discussion and 30 minutes School Link training.

Discussion and practice of preflight and pretakeoff checks, starting procedure, taxiing, use of brakes, straight climbs and climbing turns to specified altitudes, return to and maintenance of straight and level flight, level turns, glides, and gliding turns.

Period 5. Twenty minutes discussion and 40 minutes dual.

Discussion and practice of maneuvers covered in periods 3 and 4. Straight and level flight, turns, climbs, glides, and climbing and gliding turns to specified altitudes.

PRESOLO HIGH WORK PHASE

Period 6. Thirty minutes discussion and 30 minutes School Link training.

Review of fundamentals. Discussion and practice of coordination exercises in turns, steep turns, normal stalls, power-on stalls, power-off stalls, torque correction in relation to airspeed and power changes, and takeoffs. Review forces on the airplane, location of center of gravity and center of pressure (lift).

Period 7. Thirty minutes discussion and 30 minutes School Link training.

Review of fundamentals and period 6. Explain why ailerons are not used during stalls. Discussion of steep turns, takeoffs, climbing and gliding turn stalls, and spins.

Period 8. One hour School Link training.

Review all maneuvers covered to date. Discussion and practice of coordination exercises, steep turns, normal stalls, power-on stalls, power-off stalls, torque correction in relation to airspeed and power changes, takeoffs, climbing and gliding turn stalls, and spins.

Period 9. Five minutes discussion and 55 minutes dual.

Practice takeoffs, climbing turns, coordination exercises in climbing turns, steep turns, power-on and power-off stalls, climbing and gliding turn stalls, and spins. Introduce landings on return to airport.

PRESOLO LOW WORK PHASE

Period 10. Thirty minutes discussion and 30 minutes School Link training.

Discussion and practice of takeoffs, low-altitude forced landings on takeoff, following a ground pattern, traffic patterns, and landings.

Period 11. Thirty minutes discussion and 30 minutes School Link training.

Review period 10. Discussion and practice of drift correction, slips, crosswind takeoffs and landings.

Period 12. One hour School Link training.

Review all maneuvers in periods 10 and 11. Discussion and practice of slow flight holding altitude, partial, normal, and complete stalls, and high-altitude forced landings.

Period 13. One hour School Link training.

Review all previous maneuvers. Discuss and practice entry to traffic, slips, landings, and high-altitude forced landing patterns (90°, 180°, 360°, and 1080° approaches).

Period 14. Five minutes discussion and 55 minutes dual.

Practice maneuvers discussed and practiced in period 13.

SOLO PHASE

Period 15. One hour School Link training.

Review of takeoffs, normal landings, traffic patterns, crosswind takeoffs and landings. Discussion and practice of recovery from rough landings, and discussion of accuracy landings.

Period 16. Ten minutes discussion and 50 minutes dual.

Practice takeoffs and landings, crosswind takeoffs and landings, recovery from rough landings, slips, and slips to a landing.

Period 17. Five minutes discussion and 55 minutes dual.

Practice takeoffs and landings, emergencies on takeoff, crosswind takeoffs and landings, slips, and accuracy landings.

Period 18. Ten minutes discussion, 30 minutes dual, and 20 minutes solo.

Practice takeoffs and landings, slips, and crosswind takeoffs and landings. Instructor supervises a minimum of three solo takeoffs and landings from the point of takeoff. If the student is not ready for solo this period is repeated, using the entire period for dual until the student is proficient enough to solo. All such repeated periods will be marked in the flight record book as period 18 X; after the first solo the student will proceed to period 19.

Period 19. Ten minutes discussion, 20 minutes dual, and 30 minutes solo.

Discussion and dual will be devoted to a review of takeoffs and landings, crosswind takeoffs and landings, slips, and accuracy landings. Instructor will supervise a minimum of five solo takeoffs and landings from the takeoff position.

SOLO STAGE

Period 20. Thirty minutes discussion and 30 minutes School Link training.

Review of accuracy landings, slips to a spot, crosswind takeoffs and landings, coordination exercises, and drift correction.

Period 21. Thirty minutes dual and 30 minutes solo.

Practice takeoffs and landings, slips, and slips to a spot. Instructor will supervise a minimum of five solo takeoffs and slips to a spot from the takeoff position.

Period 22. Thirty minutes discussion and 30 minutes School Link training.

Discussion and practice of power approaches, wheel landings with and without power, traffic pattern, and accuracy wheel landings.

Period 23. Five minutes discussion and 55 minutes dual.

Practice power-on approaches and power-off approaches followed by wheel landings, both power-on and power-off.

Period 24. Ten minutes discussion and 50 minutes solo.

Instructor supervises and grades students on solo crosswind takeoffs and landings and wheel landings.

PRIVATE PILOT PROFICIENCY HIGH WORK PHASE

Period 25. Thirty minutes discussion and 30 minutes School Link training.

Review of all stalls, steep turns, spins, climbing turns, and gliding turns.

Period 26. Thirty minutes discussion and 30 minutes School Link training.

Review of stalls and steep turns. Discussion and practice of slow flight, spirals, and high-altitude forced landings (90°, 180°, 360°, and 1080° approaches).

Period 27. Five minutes discussion and 55 minutes dual.

Review of takeoffs, climbing turns, stalls, spins, steep turns, slow flight, high-altitude forced landings with spiral approach, gliding turns, traffic, and accuracy landings.

PRIVATE PILOT PROFICIENCY LOW WORK PHASE

Period 28. Thirty minutes discussion and 30 minutes School Link training.

Discussion and practice of 8's around pylons, accuracy landings, slips, and forced landings from 8's around pylons.

Period 29. Five minutes discussion and 55 minutes dual.

Practice on 8's around pylons, forced landings from 8's around pylons, low-altitude forced landings, coordination exercises, slips, and accuracy landings.

PRIVATE PILOT PROFICIENCY FLIGHT TEST PHASE

Period 30. One hour School Link training.

Review of all maneuvers required on private pilot flight test.

Period 31. One hour dual.

Mid-term flight test with another staff instructor. Maneuvers as outlined in C.A.A. private pilot flight test.

CROSS-COUNTRY PHASE

Period 32. Thirty minutes discussion and 30 minutes dual in Cessna 140 or other side-by-side aircraft.

Discussion of preflight check, cockpit check, starting procedure, use

of toe brakes, three-point attitude of aircraft, flight characteristics of the aircraft in relation to climbs, stalls, spins, level flight, turns, landings, and glides. Practice in cockpit check, taxiing, use of toe brakes, takeoffs, climbs, power-off and power-on normal stalls, gliding turns, and landings.

Period 33. One hour discussion and a nine-hour dual cross-country flight in four-place aircraft. Three students and instructor.

Discussion includes map preparation, flight-plan preparation, checking the weather prior to takeoff, and use of computer, *Airman's Guide*, and *Airport Director*.

The nine-hour flight will be divided into three segments or "legs." Each student will alternate as pilot-navigator, navigator, and radio operator-weather observer for one leg of the flight. Each student therefore will log one hour discussion, three hours dual cross-country, and six hours flight observer cross-country.

The following duties are designated for each position:

Pilot-Navigator: Responsible for preflighting the aircraft, knowing the airport runway system and traffic pattern, flying the aircraft and watching for other traffic, checking and following the weather conditions enroute, handling radio procedure with the control tower, executing a "lost procedure" properly when specified by the instructor, and flying the airplane for a brief period under simulated instrument flight conditions.

During this period the pilot-navigator will be given approximately 20 minutes "hood" or instrument time in order to demonstrate to his own satisfaction what happens when an unqualified pilot attempts to fly in instrument weather conditions.

Navigator: Responsible for setting up and revising the flight plan, keeping a current flight log, knowing anticipated wind conditions, and furnishing current fixes to the pilot and the radio operator for position reports.

Radio Operator-Weather Observer: Responsible for making radio contacts with range stations, obtaining the latest weather reports, route forecasts, terminal forecasts, and winds aloft, furnishing this information to the pilot-navigator. The radio operator files a flight plan by radio, makes regular position reports, and closes the flight plan with the last C.A.A. facility to be contacted prior to landing at the destination.

Period 34. One hour dual.

Practice of strange airport procedures at Illini Airport with student

dragging a potential emergency field on return trip. Practice on short field takeoff and landing procedures in small designated area of home field.

Period 35. Thirty minutes discussion and one hour dual night flying. Discussion of night flying and main points of difference in night take-offs and landings, demonstration of use of Aldis lamp.

Practice taxiing, takeoffs, traffic flying, and landings at night. Student may be soloed for one or two landings at the discretion of the instructor.

Period 36. One hour discussion and a three-hour dual night cross-country flight in four-place aircraft. Three students and instructor.

Discussion of aids to night navigation including airway beacons, radio range, main highways and towns, forced landings at night with and without flares, and night "lost procedures." Practice in night pilotage, radio range flying, light line flying, and strange field traffic patterns and night landings. On this flight each student will log one hour discussion, one hour dual night cross-country, and two hours flight observer night cross-country.

Period 37. Thirty minutes discussion (15 minutes prior to flight and 15 minutes immediately after flight) and a three-hour solo cross-country flight.

The student is checked on his map preparation, flight-plan preparation, knowledge of airports at which he will land, understanding of anticipated weather en route, and his plans in the event he becomes lost or is forced down because of weather.

Period 38. Thirty minutes discussion (15 minutes prior to flight and 15 minutes immediately following flight) and a three-hour solo cross-country flight.

The student is checked as in period 37 for a flight over a different route.

FINAL FLIGHT TEST PHASE

Period 39. One hour dual.

Review all maneuvers in preparation for C.A.A. private pilot flight test.

Period 40. One hour solo.

Practice maneuvers as directed by the instructor.

Period 41. One hour dual.

Review all maneuvers in preparation for C.A.A. private pilot flight test.

Period 42. One hour solo.

Practice maneuvers as directed by the instructor.

Period 43. One hour dual.

Instructor recommendation flight. Upon completion of flight, instructor completes student file including C.A.A. 342A and graduation certificate.

Period 44. One hour dual.

C.A.A. private pilot flight test practice.

Period 45. One hour dual (approximate).

C.A.A. private pilot flight test.

Appendix D — Aviation 101 Flight Syllabus (Without Link Trainer)

PRESOLO PHASE (12 HOURS)

Period 1. Forty-five minutes dual. Demonstration of visual preflight inspection procedure, cockpit procedures, engine starting and stopping procedures, taxiing technique, use of brakes, effect and use of controls, straight and level flight (altitude, directional control), stability in flight, effects of torque and torque correction, and determining wind direction from the ground.

Familiarization with the local area, auxiliary fields, restricted areas, landmarks, hazards to flight, and determining wind direction in flight. Students should be required to follow through on all demonstrated maneuvers. Emphasis should be placed on “follow through” technique for takeoffs and landings during presolo, periods 1 through 7.

Period 2. Forty-five minutes dual. Review of all maneuvers and procedures in period 1. Demonstration of medium and gentle turns, coordination exercises, climbs and climbing turns, and levelling off. Practice on straight and level flight, medium and gentle turns, coordination exercises, and climbs and climbing turns.

Period 3. Forty-five minutes dual. Review of maneuvers and procedures which require emphasis. Demonstration of glides and gliding turns and use and effect of trim. Practice on all previously demonstrated maneuvers.

Period 4. Forty-five minutes dual. Review of all maneuvers and procedures which require emphasis. Demonstration of characteristic stall and power-on and power-off stalls — straight ahead, to the right, and to the left. Practice on the power-on and power-off stall series.

Period 5. Forty-five minutes dual. Review of climbs and climbing turns, glides and gliding turns, and power-on and power-off stalls. Demonstration of entry into and recovery from spins. Practice on entry into and recovery from spins.

Period 6. Forty-five minutes dual. Review of power-on and power-off stalls and entry into and recovery from spins. Demonstration of slow flying, steep turns, and forced-landing procedures. Practice on entry into and recovery from spins, slow flying, steep turns, and forced landings.

Period 7. One hour dual. Review of all maneuvers and procedures which require emphasis. Demonstration of S-turns and rectangular courses. Practice on S-turns and rectangular course.

Period 8. One hour dual. Review of S-turns and rectangular courses with emphasis on slow flying. Demonstration of takeoffs and power-off landings. Practice on takeoffs and power-off landings (without flaps).

Period 9. One hour dual. Review of previous lesson on landings and takeoffs. Demonstration of power-on landings, crosswind landings, slips, recovery from bounce landings, overshooting, undershooting, and go-around procedures. Practice on takeoffs and landings under all wind conditions with stress on emergency-landing procedure, i.e., overshooting, undershooting, and go-around procedures.

Period 10. One hour dual; or 30 minutes dual and 30 minutes solo. Review of and practice on takeoffs and landings.

If proficiency permits, the last half of this period may be devoted to supervised solo consisting of three solo landings, preferably under ideal wind conditions. Prior to the first supervised solo, the student should be given a blindfold cockpit check.

Period 11. One hour dual; or 30 minutes dual and 30 minutes solo. Same as period 10.

Period 12. Thirty minutes dual and 30 minutes solo. Same as period 10.

Period 13. Forty-five minutes solo. Solo review of all maneuvers and procedures which require emphasis as briefed by the instructor.

Period 14. Forty-five minutes dual. Check and review. Check to be according to objective standards and to be performed by the flight instructor. Review as determined by the instructor.

AFTER SOLO PHASE (23 HOURS)

Period 15. One hour and 30 minutes dual. Plotting courses, determining magnetic courses, computing distance and estimated times of arrival, checking weather, studying and checking navigational facilities and airports, determining fuel requirements, loading of aircraft, and selecting altitude. Simple cross-country flight in which it is demonstrated and student follows through on determining compass course, estimating time between check points, determining course to alternate airport. At destination, student secures aircraft and plans the return cross-country flight.

Period 16. One hour and 15 minutes. Forty-five minutes dual: review of presolo maneuvers and demonstration and execution of precision turns of shallow, medium, and steep banks. Thirty minutes solo: practice on precision turns and takeoffs and landings.

Period 17. Two hours dual. Cross-country flight with stops at two or more airports other than the home airport, including radio orientation and emergency and critical situations.

Period 18. One hour and 15 minutes. Forty-five minutes dual: review of precision turns and takeoffs and landings. Demonstration of flight at various power settings in order to accomplish straight and level flight and turns in both directions without loss or gain of altitude, climbing and gliding turns at minimum controllable airspeed. Thirty minutes solo: practice of demonstrated maneuvers.

Period 19. One hour solo. Simple solo cross-country flight.

Period 20. One hour and 30 minutes. Forty-five minutes dual: demonstration and practice of secondary stalls, stabilizer stalls, excessive top-and-bottom rudder stalls, excessive high-speed stalls in turns, cross-control stalls, and rudder-exercise stalls; 720° steep turns and simulated high-altitude forced landings. Forty-five minutes solo.

Period 21. Forty-five minutes dual. Check and review. Check to be according to objective standards and to be performed by the flight instructor. Review as necessary.

Period 22. One hour solo. Solo cross-country flight.

Period 23. Two hours. Forty-five minutes dual: demonstration and practice of 90° power-off and power-on accuracy wheel landings, crosswind landings and takeoffs, short or soft-field takeoffs and landings and precision landings, using slips or flaps, and low-altitude simulated forced landings. One hour and 15 minutes solo: practice landings as assigned.

Period 24. Two hours solo. Cross-country flight with graded landings at two or more stops at airports other than the home airport.

Period 25. One hour and 45 minutes. Forty-five minutes dual: review of stalls, precision turns, and 90° approach accuracy landings. One hour solo: practice on maneuvers and procedures assigned.

Period 26. Four hours and 30 minutes solo. Cross-country flight to a point more than 200 airline miles from the base of operations with at least two full-stop landings during the flight.

Period 27. One hour solo. Review of all air maneuvers as deemed necessary by the flight instructor.

Period 28. One hour and 30 minutes dual. Final flight check by the instructor. One hour flight test by C.A.A.

Appendix E — Aviation 102 Flight Syllabus

Secondary flight training consists of a total of 44 hours of flight, 22 of which are given in two-place side-by-side aircraft and 22 hours in a two-place, tandem biplane. The Cessna 140 is used for the first 22 hours and the Boeing "Kay-det" for the final 22 hours. The flight time in the Cessna is divided into six hours of dual and 16 hours of solo; the time in the Boeing consists of 10 hours dual and 12 hours solo.

STAGE A (CESSNA)

Period 1. One hour dual.

Checkout in aircraft type. Checkout of takeoffs, landings, traffic pattern, stalls, slow flight, climbs, glides, steep turns, and forced landings. This flight should be considered a safe-for-solo check. If, in the opinion of the instructor, the student is not safe for solo at the completion of one hour dual, period 2 will be utilized as another checkout flight.

Period 2. One hour solo.

Solo practice on the maneuvers presented during the previous flight.

Period 3. One hour solo.

Review all primary maneuvers, including S-turns across road, elementary 8's, stalls, 720° power turns, and accuracy landings.

Period 4. One hour dual.

Review spins, stalls, slow flight, accidental spins; introduce chandelles and forced landings.

Period 5. One hour solo.

Solo practice on spins, slow flight, chandelles, spirals, and accuracy landings. All spins at this stage should be precision spins of either one and one-half or two turns.

Period 6. One hour solo.

Review maneuvers previously presented, plus slow flight.

Period 7. One hour dual.

Review chandelles; introduce lazy 8's, check accuracy approaches including 90°, 180°, and 360° overhead, spiral approaches, and slips.

Period 8. One hour solo.

Review chandelles, lazy 8's, slips, elementary 8's, precision spins (two turns), and 180° overhead approaches.

Period 9. One hour solo.

Review all previous maneuvers.

Period 10. One hour solo.

Review all previous maneuvers.

Period 11. One hour dual.

Review chandelles and lazy 8's; introduce on-pylon 8's, power approaches, and wheel landings.

Period 12. One hour solo.

Practice chandelles, lazy 8's, and on-pylon 8's.

Period 13. One hour solo.

Practice on-pylon 8's, power approaches, and wheel landings.

Period 14. One hour solo.

Review all previous maneuvers.

Period 15. One hour dual.

Precision spins, stalls from unusual attitudes, accidental spins, spirals, power approaches, wheel landings, chandelles, lazy 8's, and on-pylon 8's.

Period 16. One hour solo.

Review precision spins, stalls from unusual attitudes, accidental spins, spirals, wheel landings, and power approaches.

Period 17. One hour solo.

Review all previous maneuvers.

Period 18. One hour solo.

Review all previous maneuvers.

Period 19. One hour dual.

Review all maneuvers presented to date, check student carefully on all phases of precision flying, emergency procedures, and crosswind technique.

Period 20. One hour solo.

Review all maneuvers in this stage.

Period 21. One hour solo.

Solo practice on chandelles, lazy 8's, on-pylon 8's, and wheel landings.

Period 22. One hour solo.

Review.

STAGE B (BOEING)

Period 23. One hour dual.

Cockpit checkout, starting and stopping engine, straight and level flight, medium turns, climbs and glides, takeoffs, and landings.

Period 24. One hour dual.

Takeoffs, climbs, climbing turns, stalls, spins, gliding turns, 720° power turns, landings, and forced landings.

Period 25. One hour dual.

Takeoffs, landings, chandelles, lazy 8's, forced landings, spirals, and crosswind landings.

Period 26. One hour dual.

Safe-for-solo check. Student should be checked for safety in emergency procedures, stalls, spins, climbing and gliding flight, takeoffs and landings, and crosswind takeoffs and landings.

Period 27. One hour solo.

Solo practice on takeoffs, landings, climbs, glides, and 720° power turns.

Period 28. One hour solo.

Solo practice on stalls, spins, 720° power turns, and accuracy landings.

Period 29. One hour dual.

Precision spins, spins from unusual attitudes, stalls from unusual attitudes, chandelles, lazy 8's, and forced landings; introduce loop and snap roll.

Period 30. One hour solo.

Review stalls, spins, chandelles, lazy 8's, loops, and snap rolls.

Period 31. One hour solo.

Review all previous maneuvers.

Period 32. One hour dual.

Review crosswind landings, loops, snap rolls, chandelles, lazy 8's, on-pylon 8's, and forced landings; introduce split-S, slow roll, Immelman turn, and give one demonstration of inverted spin.

Period 33. One hour solo.

Solo practice on snap roll, split-S, slow roll, and Immelman turn.
NOTE — Inverted spins are never practiced solo.

Period 34. One hour solo.

Solo practice on all previous maneuvers.

Period 35. One hour dual.

Review previous aerobatics including chandelles and lazy 8's; introduce half-roll, cartwheel, and falling leaf, forced landings, and cross-wind landings.

Period 36. One hour solo.

Solo practice on previous aerobatics including half-roll, cartwheel, and falling leaf.

Period 37. One hour solo.

Solo practice on all aerobatics presented to date.

Period 38. One hour dual.

Review all aerobatics presented to date; introduce Cuban 8.

Period 39. One hour solo.

Solo practice on all aerobatics.

Period 40. One hour solo.

Solo practice on accuracy landings, on-pylon 8's, power approaches, and wheel landings.

Period 41. One hour dual.

Review all phases of low work, check precision spins, stalls, on-pylon 8's, and forced landings. Student should be advised of his shortcomings, and instructor should make recommendations regarding the maneuvers the student should practice on the next two solo flights.

Period 42. One hour solo.

Practice as recommended by instructor in preparation for final check.

Period 43. One hour solo.

Practice as recommended by instructor in preparation for final check.

Period 44. One hour dual.

Final flight check.

Appendix F — Aviation 103 Flight Syllabus

Intermediate flight training consists of 44 hours of flight as follows: three hours of local night flying in a two-place monoplane, one hour of which is dual and two hours of which are solo; 28 hours of cross-country flying in a two-place Cessna, eight hours of which are dual and 20 hours of which are solo; one three-hour night dual cross-country flight; five hours of simulated instrument flight; and five hours of instrument Link training. On all cross-country flights, radio aids to navigation are emphasized.

STAGE A (CROSS-COUNTRY FLIGHT)

Period 1. Two hours dual.

Out and back flight following a predetermined flight plan and using such radio facilities as are available. Checkout in aircraft to be used.

Period 2. Three hours solo.

Out and back flight following a predetermined flight plan and keeping an accurate flight log. Two landings en route.

Period 3. Three hours dual.

Radio-controlled flight along civil airways. Student files a flight plan by radio and while on airways performs navigation by radio only.

Period 4. Three hours solo.

Triangular-course flight following a predetermined flight plan and keeping an accurate flight log. Two landings en route.

Period 5. Three hours solo.

Radius of action, out and back.

Period 6. Three hours dual.

Radius of action to an alternate airport. Student determines time to turn to alternate airport, proceeding there, landing, and returning to base according to flight plan.

Period 7. Three hours solo.

Radius of action to an alternate airport. Follow same procedures used in period 6.

Period 8. Seven hours solo.

Solo cross-country flight to a point not less than 300 miles from the University of Illinois Airport. During this triangular-course flight, a total of three landings will be made. All available radio aids will be used.

STAGE B (NIGHT FLYING)

Period 9. One hour dual.

Taxiing, takeoffs, climbs, gliding turns, and landings.

Period 10. One hour solo.

Solo practice on takeoffs and landings. Student must stay in traffic pattern.

Period 11. One hour solo.

Same as period 10.

Period 12. Three hours dual.

Night cross-country following a predetermined flight plan over a triangular course. One leg will be over a lighted airway.

STAGE C (INSTRUMENT FLYING)

Period 13. One hour instrument Link and one hour simulated instrument.

Straight and level flight, climbs, glides, and climbing and gliding turns.

Period 14. One hour instrument Link and one hour simulated instrument.

Same as period 13, plus turns to headings, unusual attitudes, and primary patterns.

Period 15. One hour instrument Link and one hour simulated instrument.

Review and beam bracketing.

Period 16. Two hours instrument Link.

True Fade orientation.

Period 17. Two hours simulated instrument.

Radio Range orientation.

SPECIFIC FLIGHT ROUTES

Period 1. 1st leg: University of Illinois to Peoria Municipal Airport, Peoria, Illinois.

2nd leg: Peoria to University of Illinois.

Period 2. 1st leg: University of Illinois to Parks Metropolitan Airport, East St. Louis, Illinois.

2nd leg: East St. Louis to Hillsboro Airport, Hillsboro, Illinois.

3rd leg: Hillsboro to University of Illinois.

- Period 3.** 1st leg: University of Illinois to Terre Haute, Indiana, by dead reckoning. Student files flight plan at Terre Haute by radio.
- 2nd leg: Terre Haute to Indianapolis Municipal Airport along a civil airway. Land at Indianapolis and file a flight plan in writing.
- 3rd leg: Indianapolis to Lafayette, Indiana, direct, using radio only. Close flight plan at Lafayette by radio.
- 4th leg: Lafayette to University of Illinois by dead reckoning.
- Period 4.** 1st leg: University of Illinois to Capital Airport, Springfield, Illinois.
- 2nd leg: Springfield to Leckrone Field, Salem, Illinois.
- 3rd leg: Salem to University of Illinois.
- Period 5.** Radius of action, 034° T.C., and return.
- Period 6.** 1st leg: University of Illinois towards Goshen Range Station, Goshen, Indiana (distance unknown).
- 2nd leg: Blank to alternate airport, Crawfordsville Municipal Airport, Crawfordsville, Indiana.
- 3rd leg: Crawfordsville to University of Illinois.
- Period 7.** 1st leg: University of Illinois toward Vandalia Airport, Vandalia, Illinois.
- 2nd leg: Blank to alternate airport, O'Neal Airport, Vincennes, Indiana.
- 3rd leg: Vincennes to University of Illinois.
- Period 8.** To Des Moines, Iowa, 300 miles, making one stop en route on return.
- Period 12.** Dual night cross-country:
- 1st leg: University of Illinois to Lafayette Radio, Lafayette, Indiana.
- (1) SE leg of Chanute Range (RAN), 15 miles out.
- (2) Four miles north of Danville, Illinois, 35 miles out.

2nd leg: Lafayette to Chicago Radio, Chicago, Illinois.

Lights:	(1)	8 miles	- • •	
	(2)	8	- • • •	
	(3)	10	- •	
	(4)	14	--	(Rennselaer Airport)
	(5)	13	• • -	
	(6)	13	• • • -	
	(7)	12	• • • •	
	(8)	7	• -	(Hammond Airport)
	(9)	7	• -	(two left of course)
	(10)	8	--	
	(11)	5		Chicago Municipal Airport

3rd leg: Chicago to University of Illinois.

- (1) West leg of Harvey Range, 15 miles out.
- (2) Five miles west of Kankakee, 48 miles out.
- (3) NW leg of Chanute Range, 106 miles out.
- (4) SW leg of Chanute Range, 112 miles out.
- (5) University of Illinois, 12 miles south of SW leg of Chanute Range.

Appendix G — Aviation 104 Flight Syllabus

Advanced flight training consists of a total of 44 hours, 14 dual and 30 hours solo. Two hours of the dual are given in the Beechcraft Bonanza for the purpose of instructing in the use of manifold pressure, controllable pitch propeller, tricycle landing gear and flaps. The remaining 42 hours in trainer-type aircraft are devoted to preparation for the C.A.A. commercial flight test.

STAGE A (TRAINER)

Period 1. One hour dual.

Check out, takeoffs, climbs, straight and level flight, stalls, slow flight, steep turns, forced landings, gliding turns, and landings.

Period 2. One hour solo.

Review all primary maneuvers including rectangular course, S-turns across a road, elementary 8's, stalls, and landings.

Period 3. One hour solo.

Same as period 2.

Period 4. One hour dual.

Spins, stalls, slow flight, accidental spins, forced landings using definite patterns, and dragging area.

Period 5. One hour solo.

Solo practice on precision spins, stalls, and spirals with and without wind correction.

Period 6. One hour solo.

Review period 5.

Period 7. One hour solo.

Solo practice on accuracy landings using 90° and 180° side approaches.

Period 8. One hour dual.

Chandelles, lazy 8's, 720° power turns, forward slips, spirals, and forced landings.

Period 9. One hour solo.

Solo practice on maneuvers in period 8, except forced landings.

Period 10. One hour solo.

Same as period 9.

Period 11. One hour solo.

Same as period 10.

Period 12. One hour dual.

On-pylon 8's, S-turns over a road, forced landings, power approaches, and wheel landings.

Period 13. One hour solo.

Solo practice on maneuvers in period 12, except forced landings.

Period 14. One hour solo.

Same as period 13.

Period 15. One hour solo.

Same as period 14.

Period 16. One hour dual.

Accuracy landings, 1080° overhead, 360° overhead, 180° overhead, spirals, and slips.

Period 17. One hour solo.

Solo practice on all overhead approaches.

Period 18. One hour solo.

Solo practices on power approaches, wheel landings, and landings from a forward slip.

Period 19. One hour solo.

Solo practice on chandelles, lazy 8's, and on-pylon 8's.

Period 20. One hour dual.

Check on all maneuvers for precision and accuracy, check chandelles and lazy 8's for smoothness.

Period 21. One hour solo.

Stalls from unusual attitudes, slow flights, precision and accidental spins.

Period 22. One hour solo.

Review of 720° power turns, chandelles, lazy 8's, and spirals.

Period 23. One hour solo.

Review on-pylon 8's, S-turns over a road, elementary 8's, and landings from a forward slip.

Period 24. One hour dual.

Instructor checks student on all maneuvers in periods 21, 22, and 23 for precision and smoothness.

Period 25. One hour solo.

Practice maneuvers recommended by instructor.

Period 26. One hour solo.

Practice on 180° side accuracy landings.

Period 27. One hour solo.

Practice on chandelles, lazy 8's, 720° power turns, and spirals.

Period 28. One hour dual.

Instructor checks student on all maneuvers in periods 25, 26, and 27 for precision and smoothness.

Period 29. One hour solo.

Practice on maneuvers recommended by instructor.

Period 30. One hour solo.

Practice on crosswind takeoffs and landings.

Period 31. One hour solo.

Practice on S-turns, elementary 8's, and on-pylon 8's.

Period 32. One hour dual.

Instructor checks student on crosswind technique, power approaches, wheel landings, and landings from forward slips.

Period 33. One hour solo.

Practice on maneuvers recommended by flight instructor in preparation for flight test.

Period 34. One hour solo.

Same as period 33.

Period 35. One hour solo.

Same as period 33.

Period 36. One hour solo.

Same as period 33.

Period 37. One hour dual.

Flight check by instructor. On this flight the instructor should give the student a complete check on all maneuvers required on the C.A.A. flight test for a Commercial Pilot certificate and upon completion of the flight should advise the student as to what maneuvers he should practice for the flight test.

Period 38. One hour solo.

Practice on maneuvers recommended by the instructor.

Period 39. One hour solo.

Same as period 38.

Period 40. One hour solo.

Same as period 38.

Period 41. One hour solo.

Same as period 38.

Period 42. One hour dual.

Final flight check. Upon completion of this flight, instructor fills out C.A.A. form 342A.

Period 43. C.A.A. flight test.

STAGE B (BEECHCRAFT BONANZA)

Period X. One hour dual.

Operation of manifold pressure, controllable pitch propeller, retractable gear, and flaps.

Period XX. One hour dual.

Same as period X.

NOTE: Periods X and XX may be given any time during the flight training course at the convenience of the instructor and the student; however, both should be given as early as possible in the syllabus.

STAGE C (FLIGHT OPTIONS)

Five hours dual in one-hour periods in preparation for a retake of the C.A.A. flight test in the event the student fails it on the first attempt.

Appendix H — Aviation 205 Flight Syllabus

The flight instructor course consists of 26 to 32 hours of flight training divided as follows: five hours of dual instruction, five hours of solo, and 15 hours of practice flight instruction. The flight instruction practice periods are logged as dual time since a C.A.A. rated flight instructor serves as the student during all practice flight instruction periods. Provision is made for a 15-minute ground period before and after each flight. Those students who are unable to complete the C.A.A. flight test for a Flight Instructor certificate upon the completion of 25 hours are given an additional five hours of dual instruction and retake the flight test.

Period 1. One hour dual.

Checkout, preflight procedures, starting engine, engine warm-up, engine check, taxiing (using ailerons), function of controls, medium turns, gentle turns, precision turns, climbs and glides, climbing and gliding turns, coordination exercises, and confidence maneuvers.

Period 2. One hour solo.

Practice on maneuvers covered during period 1.

Period 3. One hour practice flight instruction.

Instructor acts as student and student serves as instructor on *all* maneuvers presented on period 1.

Period 4. One hour dual.

Stalls and slow flight without power, stalls and slow flight with power (partial stall, normal stall and complete stalls, power-on and power-off stalls — minimum controllable speed in climb followed by stall out of climbing turn, effect recovery with minimum loss of altitude, and minimum controllable speed in glide, power-off stall followed by cross-control stall out of gliding turn), precision spins, accidental spins, spins from climbing turns, spins from gliding turns, spins from steep turns, spins from cross-control turns, spirals, and steep climbing and gliding turns.

Period 5. One hour solo.

Practice on maneuvers introduced during period 4.

Period 6. One hour flight instruction.

Practice maneuvers presented during period 4.

Period 7. One hour dual.

S-turns across a road, rectangular courses, medium and steep 8's on a crossroad, two-bank 8's around pylons, forward slips, takeoffs, cross-

wind takeoffs, landings, crosswind landings, and 90° approaches to a landing.

Period 8. One hour solo.

Solo practice on the maneuvers presented during period 7.

Period 9. One hour practice flight instruction.

Student serves as instructor on the maneuvers presented in period 7.

Period 10. One hour dual.

180° side approach to a landing, 180° overhead approach to a landing, 360° approach to a landing, 1080° (spiral) approach to a landing, controlled slipping turns, and 720° power turns.

Period 11. One hour solo.

Solo practice on the maneuvers presented during period 10.

Period 12. One hour practice flight instruction.

Student serves as flight instructor on the maneuvers presented during period 10.

Period 13. One hour dual.

Lazy 8's, chandelles, pylon 8's, power approach and wheel landings, dragging strange fields, and downwind landings (*ONLY* if the wind velocity does not exceed 10 miles per hour).

Period 14. One hour solo.

Solo practice on the maneuvers presented during period 13 with the exception of dragging strange fields and downwind landings, which are *NOT* to be practiced solo.

Period 15. One hour practice flight instruction.

Student serves as instructor on the maneuvers presented during period 13.

Period 16. One hour practice flight instruction.

Review straight and level flight, medium turns, precision climbing and gliding turns, coordination exercises, confidence maneuvers, and all stalls.

Period 17. One hour practice flight instruction.

Review all stalls and slow flight maneuvers, precision spins, accidental spins, spins from steep turns, spirals, and slips.

Period 18. One hour practice flight instruction.

Review S-turns across road, rectangular courses, medium and steep 8's on a crossroad, two-bank 8's around pylons, forward slips, and 180° side approach to a landing.

Period 19. One hour practice flight instruction.

Review 180° overhead approach, 360° overhead approach, 1080° overhead approach, controlled slipping turns, and 720° power turns.

Period 20. One hour practice flight instruction.

Review pylon 8's, chandelles, lazy 8's, and power approach with wheel landings.

Period 21. One hour practice flight instruction.

Student serves as instructor with rated instructor flying as student. Student analyzes and corrects errors made in the following maneuvers: medium turns, climbing and gliding turns, forward slips, takeoffs, landings, 8's around pylons, and 180° side approach to a landing.

Appendix I — Aviation 206 Flight Syllabus

Basic Instrument Flight Techniques is the first course in preparing the commercial pilot for a C.A.A. instrument rating. It consists of 10 to 12 hours of instrument Link training and 20 to 22 hours of dual simulated instrument flight. Provision is made for ground discussion periods before and after each flight.

Period 1. Fifty minutes Link trainer and 10 minutes discussion. Introduce pitch control.

Period 2. Fifty minutes Link trainer and 10 minutes discussion. Review pitch control; introduce vertical S and standard rate turns.

Period 3. Fifty minutes Link trainer and 10 minutes discussion. Review vertical S and standard rate turns; introduce vertical S-turns, vertical circles.

Period 4. Fifty minutes Link trainer and 10 minutes discussion. Review vertical S-turns, vertical circles; introduce Baker patterns.

Period 5. Fifty minutes Link trainer and 10 minutes discussion. Introduce Charlie patterns and magnetic compass turns.

Period 6. Fifty minutes simulated instrument flight and 10 minutes discussion. Review pitch control and vertical S.

Period 7. Fifty minutes simulated instrument flight and 10 minutes discussion. Review; introduce standard rate turns.

Period 8. Fifty minutes simulated instrument flight and 10 minutes discussion. Review; introduce vertical S-turns, vertical circles.

Period 9. Fifty minutes simulated instrument flight and 10 minutes discussion. Review; introduce stalls.

Period 10. Fifty minutes simulated instrument flight and 10 minutes discussion. Review; introduce steep 720° power turns.

Period 11. Fifty minutes simulated instrument flight and 10 minutes discussion. Review; introduce timed turns, partial panel.

Period 12. Fifty minutes simulated instrument flight and 10 minutes discussion. Review; introduce vertical S on partial panel.

Period 13. Fifty minutes simulated instrument flight and 10 minutes discussion. Review; introduce magnetic compass turns.

Period 14. Fifty minutes simulated instrument flight and 10 minutes discussion. Review; introduce estimated times to altitude.

Period 15. Fifty minutes simulated instrument flight and 10 minutes discussion. Review; introduce unusual attitudes.

Period 16. Fifty minutes Link trainer and 10 minutes discussion. Introduce VOR tracking, radial interception, and procedure turns.

Period 17. Fifty minutes simulated instrument flight and 10 minutes discussion. VOR exercise.

Period 18. Fifty minutes Link trainer and 10 minutes discussion. VOR time and distance exercise.

Period 19. Fifty minutes simulated instrument flight and 10 minutes discussion. VOR time and distance exercise.

Period 20. Fifty minutes Link trainer and 10 minutes discussion. Introduce ADF tracking, track interception, and procedure turns.

Period 21. Fifty minutes simulated instrument flight and 10 minutes discussion. ADF exercise.

Period 22. Fifty minutes Link trainer and 10 minutes discussion. ADF time and distance exercise.

Period 23. Fifty minutes simulated instrument flight and 10 minutes discussion. ADF time and distance exercise.

Period 24. Fifty minutes Link trainer and 10 minutes discussion. Introduce L/MFR beam bracketing and orientation.

Period 25. Fifty minutes simulated instrument flight and 10 minutes discussion. Introduce L/MFR beam bracketing and orientation.

Period 26. Fifty minutes Link trainer and 10 minutes discussion. Introduce VOR holding patterns.

Period 27. Fifty minutes simulated instrument flight and 10 minutes discussion. Review VOR holding patterns.

Period 28. Fifty minutes simulated instrument flight and 10 minutes discussion. Review ADF holding patterns.

Period 29. Fifty minutes simulated instrument flight and 10 minutes discussion. Review all full panel maneuvers.

Period 30. Fifty minutes simulated instrument flight and 10 minutes discussion. Review all partial panel maneuvers.

Period 31. Fifty minutes simulated instrument flight and 10 minutes discussion. Practice.

Period 32. Fifty minutes simulated instrument flight and 10 minutes discussion. Practice.

Period 33. Fifty minutes simulated instrument flight and 10 minutes discussion. Practice.

Appendix J — Aviation 207 Flight Syllabus

Advanced Instrument Flight Procedures is the second and final course leading to a C.A.A. instrument rating. It consists of 10 to 12 hours of instrument Link training and 20 to 25 hours of dual simulated instrument flight. Provision is made for ground discussion periods before and after each flight. A person with 40 or more hours of simulated instrument flight experience may go directly into this course without first having taken Avi. 206.

Period 1. One hour and 15 minutes Link trainer and 30 minutes discussion. VOR holding and approach procedures.

Period 2. One hour and 30 minutes simulated instrument flight and 30 minutes discussion. VOR holding and approach procedures.

Period 3. One hour and 15 minutes Link trainer and 30 minutes discussion. ADF holding and approach procedures.

Period 4. One hour and 30 minutes simulated instrument flight and 30 minutes discussion. ADF holding and approach procedures.

Period 5. One hour and 15 minutes Link trainer and 30 minutes discussion. L/MFR holding and approach procedures.

Period 6. One hour and 30 minutes simulated instrument flight and 30 minutes discussion. L/MFR holding and approach procedures.

Periods 7 and 8. Two hours and 15 minutes Link trainer and 30 minutes discussion. IFR cross-country to Indianapolis and return with ILS or GCA approach.

Periods 9 and 10. Three hours simulated instrument flight and 30 minutes discussion. IFR cross-country to Indianapolis and return with ILS or GCA approach.

Periods 11 and 12. Two hours and 15 minutes Link trainer and 30 minutes discussion. IFR cross-country to St. Louis and return with ILS or GCA approach.

Periods 13 and 14. Three hours simulated instrument flight and 30 minutes discussion. IFR cross-country to St. Louis and return with ILS or GCA approach.

Periods 15 and 16. Two hours and 15 minutes Link trainer and 30 minutes discussion. IFR cross-country to Chicago and return with ILS or GCA approach.

Periods 17 and 18. Three hours simulated instrument flight and 30 minutes discussion. IFR cross-country to Chicago and return with ILS or GCA approach.

Period 19. One hour and 15 minutes simulated instrument flight and 15 minutes discussion. Review all full panel maneuvers.

Period 20. One hour and 15 minutes simulated instrument flight and 15 minutes discussion. Review all partial panel maneuvers.

Period 21. One hour and 15 minutes simulated instrument flight and 15 minutes discussion. Practice for the C.A.A. flight check.

Period 22. One hour and 15 minutes simulated instrument flight and 15 minutes discussion. Practice for C.A.A. flight check.

Period 23. One hour and 15 minutes simulated instrument flight and 15 minutes discussion. Practice for the C.A.A. flight check.

Appendix K — Aviation 101 Ground Syllabus

Ground training — 48 classroom hours (each student also receives a minimum of 13 hours of ground instruction from his flight instructor)

- I. Theory of flight (3 hours)
 - A. Forces acting on airplane in flight
 - B. Axis of rotation
 - 1. Movement about the axis
 - 2. Controls
 - C. Stability
 - D. Turning flight, including increase in wing loading and stalling speed
 - E. Elementary weight and balance
- II. Civil Air Regulations (10 hours)
 - A. Part 1. Certification, identification, and marking of aircraft and related products
 - B. Part 3.20. Airplane categories: 3.20 (a) (1), (2), (3)
 - C. Part 20. Pilot certificates
 - D. Part 43. General operation rules
 - E. Part 60. Air traffic rules
 - 1. Visual Flight Rules operation
 - 2. Instrument Flight Rules operation
 - 3. VFR and IFR flight plan operation
 - 4. Air traffic control practices and procedures
 - F. Part 62. Notice and reports of aircraft accidents and missing aircraft
 - G. Regulations of the administrator. Part 620: Security control of air traffic
- III. Meteorology (12 hours)
 - A. Basic concepts
 - B. Elements of meteorology
 - 1. Temperature
 - 2. Pressure, including relationship to altimeters
 - 3. Moisture
 - C. Clouds, including characteristics of each type and their effects on flight
 - D. General circulation
 - E. Fronts and frontal weather
 - F. Thunderstorms
 - G. Icing
 - H. Fog

- I. Reports and forecasts, with emphasis on interpretation
 - 1. Sequence report
 - 2. Winds-aloft reports and forecasts
 - 3. Area forecasts
 - 4. Terminal forecasts
- J. Weather maps
- K. Flight planning and weather
- L. C.A.A. and weather bureau flight assistance
- M. Weather recognition
- N. Elementary weather forecasting
- O. Practical application of meteorological knowledge to safe flying practices
- IV. Navigation (11 hours)
 - A. Navigation instruments
 - B. Methods
 - 1. Pilotage. Familiarization and use of sectional chart
 - 2. Dead reckoning
 - a. Use of Weems Plotter (Mark II)
 - b. Use of D-4 computer
 - c. Wind triangle
 - d. Time, speed, and distance
 - e. Fuel consumption
 - 3. Radio
 - a. VHF Omnidirectional stations
 - (1) Flying the range
 - (2) Plotting fixes
 - b. L/MF facilities
 - C. Flight plans
 - D. Use of published aids
 - 1. *Flight Information Manual*
 - 2. *Airman's Guide*
 - 3. *Notices to Airmen*
- V. Radio communications (3 hours)
 - A. Proper use of radio, including voice procedure and phraseology
 - B. Airport traffic control towers
 - C. UNICOM
 - D. Air traffic control stations
 - E. Emergency procedures and frequency
- VI. General service of aircraft and safety practices (6 hours)
 - A. Care of aircraft
 - 1. Preflight inspection procedures

2. Explanation of preventive maintenance, repair, and required inspections

B. Care of engines

1. Preflight inspection procedures
2. Fuel requirements
3. Proper starting, warm-up, and shutdown procedures
4. Explanation of preventive maintenance, repair, and required inspections
5. Use of operating manual
6. Functions, limitations, and characteristic errors of instruments required under Part 43 of the Civil Air Regulations

C. Flight safety practices

1. Operation under conditions of high altitude, extreme temperatures, gross weight, and icing
2. Wing ice, propeller ice, and carburetor ice
3. Adverse surface conditions (rough, soft, and slippery)
4. Turbulent air
 - a. Mountain and canyon effects
 - b. Surface obstruction and thermal effects
5. Marginal visibility during day and night operations
6. Radio communications failure
7. Low fuel supply
8. Aerodynamic effect of frost or snow on airfoils
9. Maximum range versus maximum endurance operations
10. Proper tie-down or securing of aircraft
11. Emergency assistance and lost procedures
12. Use of landing lights and flares
13. Obstructions to flight, such as antennae, poles, and birds
14. Procedure when operating unfamiliar aircraft

VII. Final examination (3 hours)

Appendix L — Aviation 102 Ground Syllabus

Ground training — 48 classroom hours

I. Meteorology

A. Basic concepts

B. The elements of meteorology

1. Temperature

2. Pressure

3. Moisture. Temperature-dewpoint relationship and precipitation

C. Stability

D. General cloud formations and accompanying weather

E. Pressure areas

1. Isobars

2. Winds aloft

F. Air masses

1. Movement

2. Characteristics

G. Fronts and characteristic weather

1. Cold front

2. Warm front

3. Occluded front

4. Fronts aloft

H. Thunderstorms

I. Ice and turbulence

J. Fog

K. Teletype sequence reports, winds-aloft reports and forecasts, and area and terminal forecasts

L. Weather maps

1. Interpretation

2. Analysis

M. U. S. Weather Bureau facilities

1. Weather assistance service

2. C.A.A. flight assistance service

N. Elementary forecasting of weather conditions

O. Use of knowledge of meteorology in flying

II. Aircraft engines

A. Principles of the internal combustion engine

B. Performance

1. Horsepower

2. Cylinder and manifold pressure

3. Compression ratio

- 4. Fuel-air ratio
- 5. Detonation
- C. Design and construction
- D. Fuels and fuel systems
- E. Cooling systems
- F. Lubricating systems
- G. Ignition systems
- H. Propellers
- I. Trouble shooting
- J. Inspections and maintenance
- K. Logbooks and other records
- L. General operating procedures

Appendix M — Aviation 103 Ground Syllabus

Ground training — 48 classroom hours

- I. Radio communications
 - A. Radiotelephone operator permit
 - B. Radiotelephone procedures and techniques
- II. *Flight Information Manual*
 - A. General familiarization
 - B. Sections particularly emphasized
 - 1. Air traffic control procedures
 - 2. Good operating practice
 - 3. Weather Bureau and C.A.A. Information Service
 - 4. Search and rescue
- III. *Airman's Guide*
- IV. Flight planning
- V. Navigation
 - A. Pilotage
 - 1. Charts
 - 2. Check point
 - B. Dead reckoning
 - 1. Laying out and measuring a course
 - 2. True airspeed
 - 3. Making good a course
 - 4. Time, speed, distance
 - 5. Fuel consumption
 - 6. Finding the wind
 - 7. Tracking
 - 8. Radius of action
 - 9. Alternate airport
 - 10. Off-course correction
 - C. Radio
 - 1. Ground facilities
 - a. Omnidirectional radio range
 - b. LF/MF radio Range station
 - c. Radio beacon
 - d. Radio markers
 - 2. Airborne equipment
 - a. Omnidirectional radio range receiver
 - b. Low frequency receivers
 - c. Loop antenna — (ADF)
- VI. International Morse Code

Appendix N — Aviation 104 Ground Syllabus

Ground training — 48 classroom hours

- I. Aircraft, general service and safety practices. A review of those items listed under general service of aircraft and safety practices in the Aviation 101 ground syllabus, plus the following.
 - A. Theory of flight
 1. Forces acting on aircraft in flight
 2. Characteristics of air as a fluid mass
 3. Stability
 - B. Performance characteristics of aircraft
 1. Ground effect
 2. Design
 3. Gust load safety factors
 4. Operating limitations
 - C. Care and maintenance of equipment
 1. Pressure, quantity, and rate instruments
 2. Radio and electronic equipment
 3. Flotation devices
 4. Fire extinguishers
 5. Safety belts
 6. Windshields, windows, and canopies
 7. Emergency exits
 8. Parachutes
- II. Review of navigation, meteorology, and Civil Air Regulations, including Part 42. A review of the above items in accordance with the needs of the student before taking the prescribed "aeronautical knowledge" examination for the Commercial Pilot certificate

Appendix O — Aviation 205 Ground Syllabus

Ground training — 48 classroom hours

- I. Principles of flight instruction
 - A. Steps in teaching students to fly
 - B. Common errors in instruction
 - C. How students learn
 - D. Adapting training to individual students
 - E. Keeping students interested
 - F. Keeping students fit
 - G. Analyzing student progress
 - H. Self-analysis of ability as an instructor
 - I. Summary of points to remember in flight instruction
 - J. Civil Air Regulations
 - K. Final examination
- II. Fundamentals and psychology of instructing

Appendix P — Aviation 206 Ground Syllabus

Ground training — 48 classroom hours

- I. Theory of instrument flight
 - A. Construction and function of basic instruments currently in use, including artificial horizon, directional gyroscope, turn indicator and ball, sensitive altimeter, airspeed indicator, vertical-speed indicator, magnetic compass
 - B. Partial panel instrument flying; development and current use of 1-2-3 method of control and cross-check, pitch control, and theory of turn and bank
 - C. Pitch, power, and bank method of instrument flight control; wartime enlightenment and development of artificial horizon
 - D. Contact-instrument comparison method of instrument flight; attitude instrument flight
 - E. Basic instrument flight maneuvers; stalls, steep turns, timed turns, magnetic compass turns, speed control, vertical S, vertical S-turn, vertical circle, A, B, C, and O patterns, instrument takeoff, and time and distance
- II. Civil Air Regulations
 - A. Part 20. Pilot certificates. Instrument rating requirements
 - B. Part 43. General operating rules
 1. Aircraft instrument requirements
 2. Pilot proficiency and recent experience requirements
 3. Instrument flight rules
 - C. Part 60. Air traffic rules. Enroute IFR rules
- III. Navigation
 - A. Review of basic dead-reckoning navigation. Computer review and practice
 - B. Introduction to radio navigation
 1. Plotting radio fixes
 - a. Visual-omni range bearings
 - b. ADF relative bearings
 - c. DME and VOR-TAC
 2. Estimating arrival times
 3. Preflight navigation log
- IV. Meteorology
 - A. Review of reading and interpretation of sequence reports, terminal and area forecasts, winds-aloft reports, winds-aloft analyses, storm detection radar reports, and severe weather warnings
 - B. Review of essential elements of weather, including general circulation, air masses, fronts, thunderstorms, fog, icing, turbulence, and other hazards to flight

Appendix Q — Aviation 207 Ground Syllabus

Ground training — 48 classroom hours

- I. Instrument flight publications and references
 - A. U. S. Coast and Geodetic Survey, Jeppesen, and military approach plates, RF charts, terminal area charts, and route charts
 - B. *Flight Information Manual* and *Airman's Guide*
 - C. *C.A.A. Airways Operations Training Series*
 - D. *Criteria for Standard Instrument Approaches*
 - E. *ANC Procedures for the Control of Air Traffic*
 - F. *Air Force Manuals 51-37, 51-38, 51-40*
- II. C.A.A. air traffic control system
 - A. Organization and responsibility
 - B. Approach control
 - C. Air route traffic control centers
 - D. Airport control towers
 - E. Air traffic communications stations
 - F. Communications system: Services A, C, and F of the C.A.A.
- III. Meteorology
 - A. Advanced meteorological theory. Evolution or history of forecasting through current theory
 - B. Tools of the meteorologist. Wet bulb thermometer, barometer, theodolite, radiosone, ceilometer, etc.
 - C. Weather dissemination system of the U. S. Weather Bureau and *Circular N*
 - D. World-wide weather affecting aviation
- IV. Preparation for C.A.A. written examination
 - A. Review of Civil Air Regulations
 - 1. Part 610. Minimum enroute altitudes and selection criteria
 - 2. Part 620. Security regulations
 - 3. Review of Parts 43 and 60
 - B. Navigation review
 - 1. IFR cross-country problems
 - 2. Advanced radio navigation techniques
 - 3. Dual installations, MDF, Loran, etc.
 - C. IFR weather problems
 - 1. Evaluation of daily weather map
 - 2. Analysis of teletype information
 - 3. Correcting the forecast

References

The publications listed below are basic sources of materials included in the C.A.A. written examinations for Private Pilot, Commercial Pilot, and Flight Instructor certificates and the instrument rating. These bulletins, manuals, and references are subject to revision at any time, and care should be taken to ensure use of current publications. These materials may be obtained from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

In addition to the listed references, many excellent articles, books, bulletins, manuals, films, and filmstrips are published by the flying branches of the U. S. Department of Defense, various manufacturers, and professional experts.

Civil Air Regulations

Part 1. Certification, Identification, and Marking of Aircraft and Related Products.....\$.05

Part 20. Pilot Certificates05

Part 43. General Operation Rules..... .05

Part 60. Air Traffic Rules..... .10

Part 62. Notices and Reports of Aircraft Accidents and Missing Aircraft05

Aircraft Powerplant Handbook (C.A.A. Technical Manual No. 107) 1.50

Airman's Guide (individual copies vary in price; subscription of 26 issues per year, including Flight Information Manual) 2.25

Airways Operations Training Series

Bulletin No. 1. Instrument Landing System..... .20

Bulletin No. 2. Location Markers and Homing Facilities..... .15

Bulletin No. 3. Visual-Aural Ranges and Omniranges..... .20

Bulletin No. 4. Distance Measuring Equipment and Offset Course Computer..... .15

Facts of Flight..... .50

Flight Instruction Manual (C.A.A. Technical Manual No. 100) ... 1.50

Flight Instructor Oral Examination Guide Book..... .05

Meteorology for Pilots (C.A.A. Bulletin No. 25) 1.50

Path of Flight..... .65

Personal Aircraft Inspection Manual (C.A.A. Technical Manual No. 101)75

Questions and Answers for Private Pilots..... .25

Realm of Flight..... .75

Terrain Flying (C.A.A. Office of Aviation Information)30

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Bryan, Leslie Aulls.

Flight and preflight curricula. [Urbana, 1958]

71 p. illus. 23 cm. (University of Illinois. Institute of Aviation. Aeronautics bulletin no. 21)

University of Illinois bulletin, v. 56, no. 15.

Bibliography: p. 71.

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| BULLETIN TWO: | Landscape Planting for Airports, Florence B. Robinson, 1948. |
| BULLETIN FIVE: | Evaluation of the School Link as an Aid in Primary Flight Instruction, A. C. Williams, Jr., and Ralph E. Flexman, 1949. |
| BULLETIN SIX: | Lightplane Tires on Turf and Concrete, Leslie A. Bryan, 1949. |
| BULLETIN SEVEN: | Light Aircraft Operating Costs, Leslie A. Bryan, 1949. |
| BULLETIN FOURTEEN: | Developing an Aircraft Maintenance Curriculum, Leslie A. Bryan, 1955. |
| BULLETIN FIFTEEN: | Airport Shop Operations, Leslie A. Bryan, 1955. |
| BULLETIN SIXTEEN: | College and University Airport Management, Leslie A. Bryan, 1955. |
| BULLETIN EIGHTEEN: | Simultaneous Contact-instrument Flight Training, Alexander C. Williams, Jr., Robert C. Houston, Lowell E. Wilkerson, 1955. |
| BULLETIN NINETEEN: | Flight Experience Course for Teachers and Businessmen, Leslie A. Bryan, 1956. |
| BULLETIN TWENTY: | When Classroom Teachers Learn to Fly, Harold C. Hand, 1958. |
| BULLETIN TWENTY-ONE: | Flight and Preflight Curricula, Leslie A. Bryan, 1958. |

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